# The Journal of the SOCIETY OF DYERS AND COLOURISTS

Volume 69 Number 4

#### CONTENTS

FLUORESCENT DYES	AND T	HE AI	PPLICAT	TION O	p					
	F	LUORI	ESCENC	в то Т	EXT	LES (	T. Th	orne Ba	ker)	
COMMUNICATIONS-	_									
An Electron Micr		-			2000					
THE FRACTIO Hyd			TO PI						iott)	
ZACHARIE ROUSSIN	e	0	٠	0	0	۰	(R.	Brightn	nan)	
CORRESPONDENCE									e	
NOTES										
OBITUARY NOTICE										
NEW BOOKS AND P	UBLI	CATI	IONS		4					
ABSTRACTS			,							

If you use Azoics you must try the newest

# SOLUNAPTOLS

The greatest recent advance in the Azoic Colour Process

After years of experiment a perfected material has been produced by

# JOHN W. LEITO

the modern pioneers

# SOLUNA

Are clean, easily handled
Dissolve readily in boilin
Need no additions to the
Give well balanced pH
Give solutions with exception
Produce dyeings which are Are clean, easily handle O Offer real advantages co Offer a considerable say Mean cleaner working



For samples, prices and demonstrations apply to the Sole Manufacturers

# JOHN W. LEITCH & CO LTD

MILNSBRIDGE CHEMICAL WORKS

# HUDDERSFIELD

Telephone Miinsbridge 189 & 190

Telegrams LEITCH MILNSBRIDGE

AGENTS for INDIA

Khatau Valabhdaa & Co **Vadgadi Bombay** 

SCOTLAND

Kirkpetrick & Lauder Ltd

CANADA

Prescott & Co Regd 180 Hope Street Glasgow C2 2209 Hingston Ave N D G Mentreal 28 QUE FOR POLYMERISATION OF RESIN IMPREGNATED FABRICS

Y

GES

- Efficient and automatic temperature control — initial temperature quickly obtained
- · Easy access with efficient insulation
- Compact and operative as a separate unit or part of a range
- · Efficient air filtration
- Minimum length tension
- Versatile water repellent and permanent glaze finish

THE MATHER & PLATT

BAKING STOVE

A FINE MACHINE ...

Write now for details of the M & P Service to the Textile Trade

MATHER & PLATT LIMITED

PARK WORKS : MANCHESTER 10 .

If you use Azoics you must try the newest

# LUNAPTOLS

The greatest recent advance in the Azoic Colour Process

After years of experiment a perfected material has been produced by

# JOHN W. LEITCH & CO LTD

the modern pioneers in British Azoics

SOLUNAPTOLS

SOLUNAP Are clean, easily handled powders Dissolve readily in boiling water Need no additions to the bath Give well balanced pH conditions Give solutions with exceptional wetting-out power Give solutions which penetrate more perfectly T Produce dyeings which are faster to rubbing 0 Offer real advantages coupled with economy Offer a considerable saving to you Mean cleaner working and less worry

> For samples, prices and demonstrations apply to the Sole Manufacturers

JOHN W. LEITCH & CO LTD

MILNSBRIDGE CHEMICAL WORKS

HUDDERSFIELD

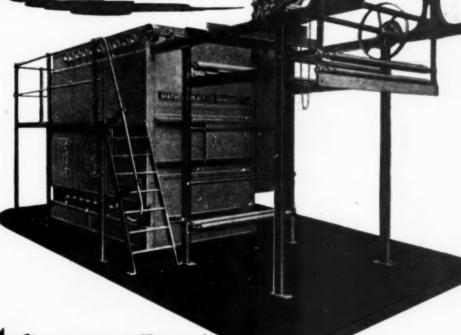
Telephone Milnsbridge 189 & 190

Telegrams LEITCH MILNSBRIDGE

AGENTS for INDIA Khatau Valabhdas & Co **Vadgadi Bombay** 

SCOTLAND Kirkpatrick & Lauder Ltd

CANADA Prescott & Co Regd 180 Hope Street Glasgow C2 2209 Hingston Ave N D G Montreal 28 QUE FOR POLYMERISATION
OF RESIN IMPREGNATED
FABRICS



Features to Hote!

- · Exceptionally high production
- Adequate polymerisation with soft or firm handle as required
- Electrical, gas or steam heating elements as required
- Efficient and automatic temperature control — initial temperature quickly obtained
- · Easy access with efficient insulation
- Compact and operative as a separate unit or part of a range
- · Efficient air filtration
- Minimum length tension
- Versatile water repellent and permanent glaze finish

THE MATHER & PLATT

BAKING STOVE

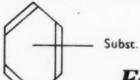
A FINE MACHINE ...

Write now for details of the M & P Service to the Textile Trade

**MATHER & PLATT LIMITED** 

PARK WORKS : MANCHESTER 10 =

NH.CO.CH2 COCH3



Freely available

THE FOLLOWING GENATOSAN

# INTERMEDIATES

**FOR** 

# DYESTUFF MANUFACTURE



**ACETOACETANILIDE** 

ACETOACET-O-CHLORANILIDE

ACETOACET-O-TOLUIDIDE

ACETOACET-O-ANISIDIDE

BIS ACETOACET-O-TOLIDIDE

For technical information and supplies write to



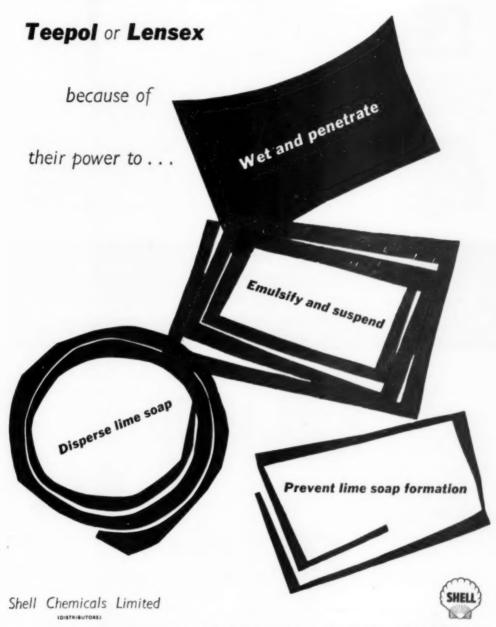
WHIFFEN & SONS LTD North West House Marylebone Road LONDON NW1

THE REPORT OF THE PROPERTY OF THE PARTY OF THE PROPERTY OF THE PARTY O

Telephone PADdington 1041-6

Telegrams WHIFFEN NORWEST LONDON

# Perfect finishing owes much to



Norman House, 105-109 Strand, London, W.C.2. Telephone: Temple Bar 4455

Divisional Offices: Walter House, Bedford Street, London, W.C. 2. 7al: Tample Bar 4455. 42 Deansgate, Manchester, 3, 7al: Deansgate 451. Clarence Chambers, 39 Corporation Street, Birminghom, 2. 7al: Hidland 6954. 28 St. Enoch Square, Glasgow, C. 1. 7al: Glasgow Central 9561. 33 Hidles Abbey Street, Dublin. 7al: Dublin 49775,

"TEEPOL" and "LENSEX" are Registered Trade Marks

TL16



LOOSE STOCK DYEING MACHINE

For all types of loose wool and other loose stock. Built in stainless steel in two capacities, 100 250 lbs. and 200 600 lbs.





PULSATOR HANK DYEING MACHINE

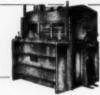
Stainless steel construction.

Dyes all classes of wool, worsted, mixture and lines yarns. Capacities from 30 to 1,500 lbs.



DRYING AND FINISHING MACHINE

For drying and finishing all classes of circular and warp knitted fabrics. Built in two sizes.



YORKSHIRE PIECE GOODS DYEING MACHINE

For dyeing heavy or medium woollen or worsted piece goods in rope form. Built in stainless steel in three sizes.

#### BROMAC FINISHING MACHINE

Imparts luxury finish to circular knitted fabrics. Automatic - built in one size for fabrics up to 33 in, finished width.



A COMPANY OF THE

# 416

MELLOR BROMLEY GROUP

# Dyeing & Finishing Machines



Shallow bath type for dyeing all types of silk or rayon fabrics in rope form. Four capacities – stainless steel.



HALF-HOSE FINISHING MACHINE

Conditions, stretches and dries automatically – 35 dozen pairs per hour.



PACKAGE DYEING

Constructed in stainless steel in nine sizes from single package to 427 packages.



PRE-BOARDING MACHINE

For shaping full-fashioned or seamless nylon hose.



ROTARY DYEING

For dyeing nylon, pure silk and rayon hose. Stainless steel construction in 25, 50, 100 and 200 lbs. capacities.



NYLON HOSE FINISHING MACHINE

Automatic - Imparts perfect matt finish to nylons of all sizes and shapes.



OVAL TYPE PADDLE DYEING MACHINE

For dyeing hose, half-hose, garments, hats and loose articles. Built in stainless steel in four stand

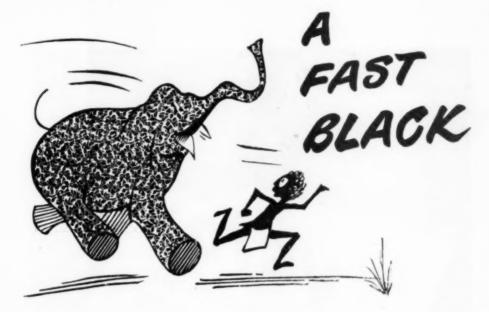


THREE BED PRESS For finishing all classes of hose and half-hose.



SP 33

SAMUEL PEGG & SON · BARKBY RD · LEICESTER · ENGLAND



FOR ALL PRACTICAL
PURPOSES
LOGWOOD BLACKS
ARE BEST ON
NYLON AND
NYLON/WOOL
MIXTURES

NYLON &
NYLON/WOOL
MIXTURE

## THE WEST INDIES CHEMICAL WORKS LIMITED

Sales Office | BRAZENNOSE STREET MANCHESTER 2

Works HEMATINE JAMAICA BWI







# HOWARDS OF ILFORD



Other Howards products include: Cetostearyl·Lauryl and Octyl Alcohols

Cyclohexylamine·Ethyl and Sodium Lactates·M.C.I.T·Sextol·Sextone B·Sorbitol

HOWARDS OF ILFORD LTD, ILFORD, ESSEX·Telephone: Ilford 3333·Telegrams: Quinology, Ilford



## SIMPLIFIED pH MEASUREMENT

OHNSONS of Hendon have put upon I the market a range of indicator papers for the measurement of pH values. They are made up in booklet form in the same way as litmus papers. Each book has, printed on the inside, colour standards with which tests can be compared. The UNIVERSAL test paper covers a pH range from one to ten in steps of one unit. The colour range extends from red,

through orange, yellow and green to blue and is accurate to within 0.5 pH. For work requiring a higher degree of accuracy there are the COMPARATOR test papers in four kinds. These cover pH 3.6 to 5.1, 5.2 to 6.7, 6.8 to 8.3 and 8.4 to 10. Each book has six colours printed inside, together with figures, arranged in steps of 0.3 pH.

> Invaluable to Chemists and research workers Descriptive leaflet free

**IOHNSONS OF HENDON LTD** 

335 Hendon Way London NW4

and at 37 Brown Street Manchester 2 and 64 Kingston Street Glasgow C5

#### MEMBERS' CHANGES OF ADDRESS

- Bacon, G. D., formerly of Morley, near Leeds, to c/o The Geigy Co. Ltd., 54 Royal Avenue, Belfast, Northern Ireland
- Berwick, J. R., formerly of Boston 10, Mass., to Sandoz Chemical Works Inc., 312 Main Street, Hudson, Mass., U.S.A.
- Butterworth, E., formerly of Courtaulds Ltd., Manchester, to "Rostherne", I Burlington Drive, Davenport, Stockport
- Carbone, A. J., formerly of Boston 10, Mass., to Sandoz Chemical Works Inc., 312 Main Street, Hudson,
- Mass., U.S.A. Cowap, D., formerly of 41 Poplar Road, to 33 Barton Road,
- Swinton, near Manchester Cronshaw, Dr. C. J. T., formerly of I.C.I. Ltd., Blackley, to Alnwick, Prestwich Park, Prestwich, Manchester David, J., formerly of Low Moor, Bradford, to 38 Clifton
- Gardens, London N.W.11
  Duarte, J. W., formerly of Bleachers Association Ltd., Bromley Cross, Bolton, to Arlington Plastics Develop-ment Ltd., Arlington Works, 38 Barretts Grove,
- London N.16 Fletcher, R. E., formerly of Clayton Aniline Co., to 9
- Fairway, Fairfield, Droylsden, Lancs. G. N., formerly of 1 Imperial Avenue, to Green
- Elms, Birmingham Road, Kidderminster, Worcs. Genoff, W., formerly of Derby, to P.O. Box 1049, Buckingham/Que., Canada
- Hannah, T. B., formerly of Baillieston, Lanarkshire, to The Home House, Church Lane, Duddingston, Edinburgh Hewitt, G. E., formerly of Belfast, to 114 Ballylough Road, Annsborough, Co. Down, Northern Ireland
- Highley, J. E., formerly of Sowerby Bridge, Yorkshire, to c/o The Carpet Man. Co. (S.A.), 98 Gale Street,
- Durban, Natal, South Africa Lamb, H., formerly of Ilkeston, Derby, to Martins (Leics.) Ltd., Slater Street, Leicester

- Longley, P. C., formerly of Potternewton House, to 48 Kingswood Gardens, Leeds 8
- MacFarlene, H., formerly of Dumbarton, to 157 West Stirling Street, Alva, Clackmannanshire, Scotland
- MacMahon, L. F., formerly of Lowell, Massachusetts, to Haartz Auto Fabric Co., 3 Bridge St., Box No. 306,
- Newton 58, Mass., U.S.A.
  McMillian, R. A., formerly of Bangor, to The Irish Tapestry Co. Ltd., South Street, Newtownards, Co. Down, Northern Ireland
- Mawson, Miss M. A., formerly of Baildon, to "Holmgarth", Layton Lane, Rawdon, near Leeds
- Mincher, G. W., formerly of 27 Parkfield Rd., Undercliffe, to 5 Ennendale Drive, Bolton, Bradford
- x, J. D., formerly of Clayton, Manchester 11, to "Hillrise", Longhurst Lane, Mellor, near Stockport
- Pathak, A. G., formerly of 10 The Bharti Nivas Soc. Ellis Bridge, to Gul-Mahor, Navrangpura, Ahmedabad 9. India
- Ramadam, A. S., formerly of 45 Beaker Street, to Nottingham Technical College, Shakespeare Street, Nottingham
- Sarkari, K. B., formerly of Bombay 4, to South Breeze, 96 New Park Street, Park Circus, Calcutta 17, India
- Scholefield, J. A., formerly of 9 Viewfield Place, to 3A Ivy Bank Buildings, St. Ninians, Stirling, Scotland Slater, V. W., formerly of London W. I, to Laporte Chemicals
- Ltd., Kingsway, Luton, Beds. Smith, P. C., formerly of Wrose, Shipley, to 9 Nab Wood
- Terrace, Shipley, Yorks.
  Wilkinson, D. B., formerly of Harrogate, to c/o Sandoz
  Products Ltd., Frog Island, Leicester
- Wilson, R. E. K., formerly of Batley, to "Holmwood", Crow Lees Road, Mirfield, near Wakefield
- Wood, Fred, formerly of Timbersbrook, Congleton, to e/o 109 Woolley Lane, Hollingworth, near Manchester



## DYEING CAN BE A "CHANCY" BUSINESS

As every dyer knows, bad dispersion of the dye can upset the most careful dyeing — preventing level shades and producing streaky colours. But by the simple process of adding Calgon (Sodium Metaphosphate) to the dye liquor, you can ensure that the dyes are properly dispersed. Calgon also eliminates the bad effect of any lime soap which may be on the fibre, and dyes sensitive to traces of lime salts can safely be used. Results become more certain and consistent, and colours clearer and brighter. Calgon is invaluable for use in the Cotton and Rayon industries as well as for Woollens and Silks. Write for a copy of "Calgon in the Textile Industry".

# CALGON

for better dyeing

ALBRIGHT & WILSON LTD · Water Treatment Department
49 PARK LANE · LONDON · W . I · Telephone: GROsvenor 1311 · Works: Oldbury & Widnes



## The Journal of the Society of Dyers and Colourists

(Subscription rates for non-members £4 per annum, post free) (Abstracts section only printed on one side of paper- £1 10s 0d per annum)

#### NOTICE TO MEMBERS AND SUBSCRIBERS

Readers requiring general information regarding the Official Notices, List of Officers of the Society, etc. should consult pages 1-6 of the January 1953 and pages 237-240 of the July 1952 issues of the Journal, or write to The General Secretary, The Society of Dyers and Colourists, Dean House, 19 Piccadilly, Bradford, Yorkshire (Telephone Bradford 25138-9). Editorial Communications should be addressed to The Editor, at the same address.

## Forthcoming Papers

The following papers have been accepted by the Publications Committee, and will appear in future issues of the Journal-

#### LECTURES

Dyeing in the Carpet Industry

A. Gaunt and P. Robinson

The Use of Hydrolysable Esters in the Control of Dyebaths

R. J. Hannay, W. H. Major, and R. Pickin

Structure and Properties of Natural and Allied Fibres

W. R. Moore

The Effect of the Soaping Aftertreatment on Vat Dyes

F. Sumner, T. Vickerstaff, and E. Waters

#### COMMUNICATIONS

Polymerisation of a Series of Vinyl Monomers in Wool

N. K. Boardman and M. Lipson

Studies in the Fundamental Processes of Textile Printing.

V- The Transfer of Disperse and Water-soluble Dyes to Cellulose Acetate during Steaming

E. H. Daruwalla and H. A. Turner

A Simple Microthermostat for Use in Colorimetric and other

Optical Measurements W. J. Marshall

Some Aspects of the Drying and Heating of Textiles.

VIII - Note on Modifications produced by Thermal Treatments of Acetate Fibres

7. M. Preston and M. V. Nimkar

The Use of Non-ionic ! evel-dyeing Assistants in Pre-chrome

Complex Dvebaths

- Trade Marks Designs -Patents -P. THOMPSON & CO CHARTERED PATENT AGENTS

LINCOLN'S INN FIELDS LONDON WC 2 Holborn 2174

12 CHURCH STREET LIVERPOOL 1 Royal 3172

# Lanasyn Grey BL



For blue-grey shades possessing a high standard of fastness to light and wet treatments on Wool, Nylon, and Wool/Nylon Blends







Caledon Printing Brown 4R is a new vat dyestuff for printing all types of cotton and viscose materials. It gives rich redbrown shades, the hue remaining practically unchanged on building up or in artificial light.

Caledon Printing Brown 4R has excellent fastness to light, washing and chemick, and is non-tendering.

# Caledon Printing Brown 4R

For further information please apply to:

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.I



## THE JOURNAL

OF THE

# Society of Dyers and Colourists

Volume 69 Number 4

**APRIL 1953** 

Innued Monthly

## Proceedings of the Society

#### Fluorescent Dyes and the Application of Fluorescence to Textiles

T. THORNE BAKER

Meeting of the West Riding Section held at the Hotel Metropole, Leeds, on 4th March 1952, Mr. C. O. Clark in the chair

Fluorescence and phosphorescence have been studied for many years on an extensive scale, and, while this paper is chiefly concerned with dyes which exhibit fluorescence, the majority of the early researches dealt with the fluorescence of vapours and liquids. E. Lommel 1, for example, studied the fluorescence of iodine vapour in 1883; he observed on irradiating iodine vapour with sunlight that a bright greenish-yellow fluorescence was emitted. Still earlier, we find E. Becquerel 2 describing his researches on various luminous effects resulting from the action of light.

About a.b. 1600 Vincenzo Casciorola had produced phosphorescent barium sulphide, but it was not until the value of barium platinocyanide in making X-rays visible to the eye was discovered by Roentgen (1895) that serious attention was devoted to inorganic phosphors. Television has, of course, greatly increased their interest, and the range of substances which fluoresce under excitation by cathode rays has been extended to a degree that was quite unforeseen a few years ago.

Phosphorescence and fluorescence are usually distinguished by the long afterglow of a phosphorescent substance after irradiation has ceased, while a fluorescent substance appears to cease glowing immediately the exciting radiation is cut off.

In recent work with fluorometers, however, it has been found that there is a finite duration of all fluorescence emission, and the rate of decay, as in the case of phosphorescence, appears to be exponential. Szymanowski's Kerr-cell fluorometer, based on the original phosphoroscope of Becquerel, enables a decay time of 10<sup>-9</sup> sec. to be measured <sup>3</sup>. Pringsheim <sup>4</sup> observes that typical fluorescence is not inconsistent with a relatively long afterglow, while Perrin in 1929 actually used the phrase "fluorescence of long duration" <sup>5</sup>.

The fluorescence of aromatic hydrocarbons is mostly in the ultraviolet, and in some cases is independent of the wavelength of the exciting radiation. The simplest molecules which show luminescence are those of benzene, its homologues, some of its derivatives, and heterocyclic ring compounds. All these molecules have a common feature in their structure, the presence of conjugated double bonds, as is the case with the more complex molecules of many organic dyes and the polymers they form in aqueous solution. As Garlick <sup>6</sup> states, the absorption spectra of the homologous series formed by benzene, naphthalene, anthracene, etc. are not greatly different from each other in general appearance, but as the number of conjugated rings increases both the absorption and the emission spectra move towards longer wavelengths.

The fluorescence of compounds consisting of five condensed benzene nuclei changes from red to violet with shortening of the longest straight chain of rings in the molecule (Table I).

Absorption and emission spectra are considerably altered by substitution in the ring systems. Thus a nitro or a halogen group will cause a decrease in luminescence efficiency, while an amino or a sulpho group will increase it. Metallic atoms in the molecule will also affect the colour, the brilliance, and the fastness of the fluorescence, just as metallic atoms can affect the colour reflected by a pigment.

According to the law discovered empirically by Stokes, the wavelength of fluorescence is always greater than, or in the limiting case equal to, that of the exciting light. The shift is in general small; but in the case where absorption in the ultraviolet results in fluorescence in the visible spectrum, this shift may be far greater, the luminescent spectral band actually overlapping that of the reflected visual colour, though perhaps 2000 A. apart.

The dyes which show fluorescence to a marked degree are derived from a limited number of classes. The xanthen group includes rhodamine and fluorescein, and the azine group safranin and Magdala red, while the aeridine group provides aeridine yellow and orange, trypaflavine, homophosphine, etc. The 4-amino-1-8-naphthalimides, e.g. Brilliant Sulphoflavine, the thiazole dye Thioflavine T, the

TABLE I
Fluorescence of Polycyclic Aromatic Hydrocarbons
dissolved in Hexane?

u.	solved in Hexane	
Compound	Structure	Colour of Fluorescence
Pentacene, $C_{89}H_{14}$		Red
$\begin{array}{c} 1{:}2{:}6{:}7{\cdot}Dibenz\\ anthracene, C_{23}H_{14} \end{array}$		Yellow- green
$\begin{array}{l} 4:5\text{-Benzochrysene,} \\ \mathrm{C_{12}H_{14}} \end{array}$		Blue-green
$\begin{array}{c} 1{:}2{:}5{:}6{\cdot}Dibenz\\ anthracene, C_{22}H_{14} \end{array}$	8000	Blue (3900, 4150, 4500 a.)
3:4-Benzopyrene, $C_{10}H_{12}$		Blue-violet (3947, 4033-4089*, 4134-4160*, 4286-4319*, 4354A.)
Perylene, $C_{10}H_{11}$		Blue
Coronene, $C_{14}H_{12}$		Blue-violet

· Strong double bonds

anthraquinone dye Duranol Brilliant Yellow 6G, Auramine G, and many Indigosol (DH) and Soledon (ICI) dyes also show bright fluorescence. But there are no instances of fluorescence among the large number of azo dyes, except in rigid solvents.

Of the fluorescent dyes, the rhodamines have perhaps been most extensively investigated from a practical standpoint, and the work of Fonda deserves particular study, dealing as it does with the quantum yield of films of solid solutions and their fading under continuous exposure. Fonda studied the excitation of Rhodamine solution by radiation in the visible spectrum, using the three prominent lines in the mercury spectrum of 5461, 5770, and 5791 A.; but it is probable that actually a considerable degree of excitation comes from the ultraviolet band at about 3600–3900 A., which is present in average daylight though invisible to the

The concentration of the dye is of great importance. A strong solution of rhodamine, for example, will appear merely red. On considerable dilution it becomes strongly fluorescent and of a yellower hue. Fonda  $^8$  found that a concentration of  $4\times 10^{-4}$  m.

is the limit above which the fluorescence of Rhodamine B decreases in accordance with Perrins'

$$Q=Q_0 \sigma^{-kc}$$

(c= concentration; k= a factor depending on the character of the dye and of the solvent used). This decrease in quantum yield Q with increasing concentration has been ascribed to a disturbance of the emission process through some kind of resonance action. Fonda's results for Rhodamine B are given in Table II.

Molarity (M.)	Peak Wavelength (A.)	Fluorescence Yield (% of incident energy)
$4 \times 10^{-6}$	5900	5.4
$4 \times 10^{-6}$	5930	28.3
$4 \times 10^{-4}$	6050	44.0
$4 \times 10^{-3}$	6210	4.6
$4 \times 10^{-2}$	6250	1.0

In the case of films dyed with Rhodamine B, or having the dye dispersed in them, Fonda claimed that the fluorescence yield was greatest in the case of cellulose acetate, falling off in the order—cellulose nitrate > glyptal resins > gelatin. These films may be regarded as solid solutions, and hence the effects of both resin and solvent on the fluorescence of a dye must be considered.

It may be mentioned here that many dyes become fluorescent in solution if the temperature be lowered to the solidifying point of the solvent. Thus crystal violet becomes fluorescent in ethyl alcohol at — 158°c. Rosamine, auramine, and fuchsine <sup>11</sup> are other examples of dyes which exhibit fluorescence when in rigid media. According to Pringsheim <sup>12</sup>, many azo dyes, ordinarily non-fluorescent, become fluorescent when adsorbed on textile fibres.

#### COMMERCIAL APPLICATIONS OF FLUORESCENCE

The appearance a few years ago of advertisements and posters in very bright colours, due to the use of a small number of fluorescent dyes, caused considerable interest, although fluorescent dyes have been known for many years. The essential feature of a fluorescent substance is that, when suitably presented, it is capable of remitting part of the radiant energy it absorbs as visible radiation, thereby increasing the apparent brightness of the colour.

It has been claimed that, whereas the brightest pigment can reflect as much as 65% of the incident visible light, certain fluorescent surfaces will apparently reflect 120%, owing to the additional light due to fluorescence resulting from absorption of invisible ultraviolet radiation present in daylight.

The essential feature of the Day-Glo process evolved by the Switzer brothers <sup>13</sup> for the manufacture of poster colours is the initial formation of an approx. 2·5% solution of the dye in a thermosetting resin such as urea— or melamine-formaldehyde. The efficiency is very dependent on the pH, and great care has to be taken in computing the amount of acid curing agent to be added to the resin syrup, for the amount depends both upon the

resin itself and on the particular dye. Dyes of the highest purity and concentration are used to avoid complications from diluents.

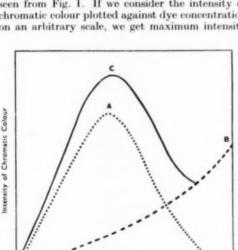
In the cured resin, the dyes may be regarded as being in solid solution, in a form in which fluorescence yield is at a maximum. It may be noted that G. A. Widmer has proposed the use of dyed particles of urea-formaldehyde resins as pigments for paints and inks.

The resin syrup, after the dyes have been introduced, is heated to about  $90^{\circ}$ C., and stirred until gelation has taken place. The gel is then shredded, and the shreds are cured by means of infrared radiation, when they become extremely hard. They are next ground to a particle size averaging about  $15 \mu$ ., when they are sieved and graded. The particles are then dispersed in a medium of a suitable printing ink varnish, the refractive index of the varnish being very close to that of the resin.

The particle dispersion must be such that the particles are not tightly compressed together as in an ordinary printing ink, but are separated so that the light striking the surface can penetrate to the white reflecting surface on which the print is made and can be reflected back again through the film of ink. In this way each tiny particle acts as a luminous fluorescent source, and maximum brightness is apparent. The thickness of the printed image should be 0.003 in., and there should be approx. 0.042 mg. of dye dispersed per square centimetre of surface.

The ideal method of printing is the silk-screen process, using stencils made on a comparatively coarse-mesh silk such as 6 XX or 8 XX.

It has been found necessary to effect a compromise between the concentration of colour desirable for maximum reflection and that necessary for maximum fluorescence, as may be seen from Fig. 1. If we consider the intensity of chromatic colour plotted against dye concentration on an arbitrary scale, we get maximum intensity



Concentration of Dye

Reflected chromatic light
 Emitted light
 Total emitted + reflected light

Fig. 1

at the point B. On the other hand, maximum brightness due to fluorescence occurs at A, where the visual reflected colour is comparatively weak. But the sum of the ordinates of reflected light and fluorescent light passes through a maximum at C, which is considerably brighter than the original point B. Thus in order to obtain the brightest effect, the reflected colour is sacrificed to some extent.

The Switzers contend that by forming a solid solution of certain dyes within the fibres of a fabric, brilliant colours can be obtained which fluoresce in daylight. To obtain the most brilliant fluorescence in daylight with cellulose acetate fabrics, not more than 0-025 g. of a dye reflecting yellow-green light is dispersed in each cubic centimetre of fabric filament, while the corresponding figure for dyes reflecting red light is 0-015 g./c.c. This apparent anomaly in the optimum mass of dye per unit volume holds good for all the daylight-fluorescent pigments, as well as dispersions, according to the various Switzer patents <sup>13</sup>.

Fluorescent fabrics are being used on a quite extensive scale in the U.S.A. for swim suits, jumpers, frocks, and of course for theatrical effects. Very large men's ties have found popular favour, and curiously enough, two tons of fluorescent shoe-laces were sold in a single month in late 1951. Whilst this fashion for wearing bright colours is not likely to arouse such enthusiasm in this country, it may be mentioned that fluorescent flags are in use in association football, and experiments are being made with such things as greyhounds' racing coats and men's and women's sports jerseys.

The Switzers' early work was largely in connection with signalling devices for military purposes, and Day-Glo played an important part towards the end of the Second World War. Ground signals can be seen distinctly at up to four times as great a distance as signs in ordinary colours, and owing to the effect of scatter in the atmosphere at dawn and dusk, their brilliance is especially great just at the periods when visibility is least with ordinary objects. Considerable use has been made of flucrescent signs and signals in the present conflict in Korea. Numerous applications to naval and military problems cannot be mentioned for obvious reasons, but it is a fact that the use of inks for poster and advertising purposes has now fallen far behind that in the industrial and nonadvertising field in the U.S.A.

#### FADING

It is generally known that high fluorescence goes hand in hand with rapid fading, and Day-Glo posters are not expected to last more than six weeks in summer sunshine. Fading tests made in either ultraviolet radiation or the arc Fade-ometer have proved misleading, as have also fading tests on specimens placed in scaled glass or Perspex cylinders containing atmospheres of varying relative humidities. The most reliable test appears to be to expose specimens to daylight on the roof, where they are subjected to all weathers, wet and dry. In many cases the fluorescence and the

tinctorial strength of the paints last for months rather than weeks. Specimens are checked at intervals on a photocell reflectance meter (Fig. 2) and with the spectrophotometer.

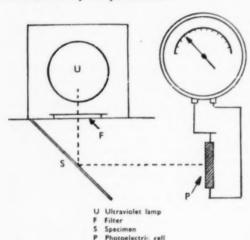


Fig. 2-Reflectance Meter

Fading has been ascribed by Pringsheim <sup>14</sup> to the simultaneous activation of two neighbouring molecules sufficiently close to one another to interact. According to Fonda <sup>8</sup>, the speed of fading can be expressed as—

$$K = \frac{1}{t} \log \frac{F_0}{F_t}$$

where  $F_0$  and  $F_t$  refer to the fluorescent energies measured initially and at t hr.

A considerably greater resistance to fading was found by Fonda with Rhodamine B by substituting potassium for hydrogen in the carboxyl group. Thin films of the potassium salt dissolved in cellulose acetate were exposed to a mercury capillary lamp at a distance of 6·3 cm. (4000 footendles), and lost only 10% of their fluorescence after 1500 hr.

#### BRIGHTENING AGENTS

There is a large and growing patent literature relating to organic dyes which brighten white textiles and papers by adding blue fluorescent light, and are the exact opposite to the ultramarines formerly used to absorb the yellowing tint of a fabric. The benzoylaminostilbenes and the benziminazoles are examples of these dyes, as are also water-soluble derivatives of aminocoumarones. These dyes, which absorb the near ultraviolet and fluoresce blue or blue-violet, are used on an extensive scale for domestic washing agents.

#### OTHER APPLICATIONS

A method of examining finished metal parts for flaws and cracks, developed by the Switzer brothers, has found wide application in the U.S.A. A luminescent, flaw-penetrating liquid is applied to the metal object, which is then carefully wiped telean, and examined in ultraviolet radiation, when any fluorescent material that has penetrated into flaws or cracks becomes clearly visible. It is claimed that very fine cracks which are practically invisible to the eye can be easily detected. An alternative method is to cause the fluorescent medium in the flaw to be exuded from the surface openings by applying a light-reflecting absorption agent such as talc to facilitate detection in ultraviolet radiation.

An entirely novel use of fluorescent dyes is that described in an invention <sup>15</sup> for sorting envelopes and parcels at the rate of about five hundred per minute. The letters bear an invisible mark in cipher printed in fluorescent material, their position or number relating to a code. A scanning device interprets the flashes of fluorescent light falling upon a ptotoelectric cell, the output of which actuates a triggering device that controls the sorting mechanism. The fluorescing dye, 4:4'-bis(p-aminobenzoylamino)stilbene-2:2'-disulphonic acid, is stated to be, when illuminated by mercury radiation of 3650 A., fifty times brighter than an ordinary envelope.

These are only a few examples of the directions in which fluorescent phenomena are being explored, but the exploitation of dye fluorescence should assume great industrial importance in the future.

(MS. received 8th March 1952)

#### References

- <sup>1</sup> Lommel, E., Ann. Physik Chem., [iii], 19, 356 (1883).
- Becquerel, E., Ann. Chim. Phys., [iii], 55, 5 (1859); 57, 40 (1859); 62, 5 (1861). La Lumière, ses Causes et ses Effets (Paris: Gautier Villars, 1867).
- <sup>3</sup> Szymanowski, W., Z. Physik, 95, 450 (1935).
- <sup>4</sup> Pringsheim, P., Fluorescence and Phosphorescence (New York and London: Interscience Publishers, 1949), p. 290.
- <sup>5</sup> Perrin, F., Ann. Physique, [x], 12, 169 (1929).
- <sup>6</sup> Garlick, G. F. J., Luminescent Materials (Oxford University Press, 1949), p. 204.
- <sup>7</sup> Pringsheim, P., op. cit., p. 411 (Table 79).
- <sup>8</sup> Fonda, G. R., J. Optical Soc. Amer., 26, 316 (1936).
- Perrin, J., Compt. rend. Acad. Sci. Paris, 177, 469 (1923).
- 10 Perrin, F., ibid., 178, 2252 (1924).
- <sup>11</sup> Schmidt, G. C., Ann. Physik, [iv], 65, 247 (1921).
- 12 Pringsheim, P., op. cit., p. 442.
- <sup>13</sup> Switzer, J. L., and Switzer, R. C., BP 672,763.
- 14 Pringsheim, P., Z. Physik, 10, 176 (1922).
- <sup>15</sup> Postmaster-General, BP 656,873 (1946).

#### COMMUNICATIONS

# An Electron Microscope Examination of Wool The Fraction resistant to Peracetic Acid-Ammonium Hydroxide Treatment

B. MANOGUE and R. L. ELLIOTT

The fraction of wool fibres resistant to peracetic acid and ammonium hydroxide treatment has been investigated with the electron microscope. The insoluble residues consist of (i) a cuticle sheath, which encloses (ii) fibrous material from the cortex.

#### INTRODUCTION

According to Alexander and Earland <sup>1</sup> treatment of wool fibres with 1·6% aqueous peracetic acid followed by extraction with 0·1 n. ammonium hydroxide yields an insoluble fraction, the subcuticle membrane, which is a histological component of the fibre. The insoluble residues comprise 7–10% by weight of the fibres, and the published photomicrographs <sup>1</sup> show them to be thin, almost structureless, tubes. It is also claimed that the previous history of the wool does not affect the isolation and appearance of the residues <sup>1-3</sup>. The residues are said to be identical with the Zwischenmembran <sup>4</sup>, or outer layer of the cortex of wool and hair fibres, which has been separated by Zahn and Haselmann <sup>5</sup>.

From the accounts of previous electron microscope studies 6-9 of the residues prepared by Alexander's method, it is concluded, however, that cortical cells, fibrils, epicuticle\*, and epicuticle with adhering material are all present. Mercer has suggested that the resistant residues which are obtained consist of tubular membranes enclosing a variable quantity of cortex, the tubular membranes being the epicuticle (i.e. outer layer of the cuticle 11-13) with adhering material. Examination with the phase-contrast microscope has also revealed the presence of cuticle material 14.

#### EXPERIMENTAL

Three kinds of wool have been treated with aqueous peracetic acid and ammonium hydroxide, following the procedure of Alexander and Earland <sup>1</sup>. The wools used were—solvent-extracted merino wool, dry-chlorinated wool, and Chlorzymetreated wool.

When the residues from each of these wools were examined under an optical microscope, using transmitted light, they appeared similar to each other, and to those shown in Alexander's photomicrograph 1. After the residues had been stained with methylene blue, however, more details of their structure were revealed. Fig. 1 is a photomicrograph of the residues from solvent-extracted wool. (The residues from dry-chlorinated wool, after staining, were similar in appearance, and are not shown.) Two major components seem to be present—(i) an outer sheath with scale markings, which encloses (ii) fibrous material. In places, small sacs similar to those formed in the Allwörden reaction can be detected on the outside of the cuticular sheath (indicated by an arrow in Fig. 1). When pressure is applied to the coverslip, the

cuticular sheath was split longitudinally, and the fibrous material was then dispersed.

The electron microscope investigation of the residues is somewhat difficult, since they are generally too thick for the beam to penetrate; previously, fragments from the residues have been examined. In order to obtain less ambiguous results, the pseudo-replica technique 15 was used for the preparation of specimens for electron microscope examination: A drop of a suspension of the residues in water was placed on a glass microscope slide, and, whilst still moist, the residues were separated from one another by gentle manipulation with a needle. The still intact residues were then dried down, shadowed with gold, and flooded with a 0.3% solution of cellulose nitrate in amyl acetate. The cellulose nitrate film which formed was then stripped from the slide under water, and either a replica of the residue was obtained, or part or all of the residue was detached with the film.

The electron microscope used was a Metropolitan-Vickers E.M.2. The electron micrographs are negative prints, and are reproduced at about  $2000 \times$ .

#### RESULTS

Fig. 2 is an electron micrograph of residues from dry-chlorinated wool fibres after treatment with peracetic acid and ammonia. On the left is a replica of a residue, and on the right is a residue. An intact residue is obviously too thick for satisfactory examination, but on the outside, parts of a thin membrane, the epicuticle, partly lifted from the rest, can be seen. On the replica it can be seen that the epicuticle follows the contours of the scales and is continuous. Fragments of epicuticle detached from the residues can also be detected; one piece lies across the centre of the micrograph. In Fig. 3 the cuticular sheath has swollen; thickened areas correspond to overlap of the scales. On the right of the micrograph the dense region is the inner fibrous material seen on the photomicrograph. Another field of the cuticular sheath is shown in Fig. 4. The ridged structure corresponds to the longitudinal striations shown on replicas of the scales of damaged wool fibres 8, 16. Where the sheath has split, the ridged structure can be seen to be fibrous material. When a replica of a residue was obtained, it was often found that the epicuticle was stripped from the residue; e.g. Fig. 5 shows a replica with attached fragments of epicuticle. It can be seen that the epicuticle is fractured along the edge of the scale. Careful inspection reveals

The terminology used is that suggested by Lindberg et al. 10.

that the surface of the residue has the ridged structure characteristic of the endocuticle.

In order to determine whether the residues owe their insolubility to the cuticle sheath, descaled fibres were treated with peracetic acid and ammonium hydroxide. It is known that a Chlorzyme-treated wool fibre is almost completely devoid of scale structure 8, 17; the insoluble residues obtained after Alexander's treatment of Chlorzyme-treated wool fibres were stained with methylene blue, and are shown in a photomicrograph (Fig. 6). The residues have a fibrous structure. Electron microscope examination has shown that the residues were composed of many fibrils. Often the fibrils were arranged so densely that the electron beam did not penetrate parts of the specimen. In some places, however, the residues had spread slightly, and Fig. 7 shows the fibrils and microfibrils which are present in the insoluble fraction. Very thin membranes were occasionally detected associated with the fibrous material.

#### DISCUSSION

From these results it is clear that treatment of undamaged wool fibres with peracetic acid and ammonium hydroxide isolates not a single but several histological components of the fibre. The insoluble fraction is heterogeneous, and is composed of (i) a cuticle sheath which encloses (ii) fibrous material from the cortex. These results confirm the observations of Gralén, Lagermalm, and Philip 6 and of Mercer 9. The residues obtained from medullated fibres have medulla present as well as these two components 18. Alexander and Earland 1 did not detect the cuticle component, since they examined only unstained, resistant material with transmitted light. Mercer believes that the cuticle sheath is the more resistant of the two components. This may be true, but in our preparations we did not obtain the cuticle sheath free from cortex material. The cuticle sheath which is present is classed by Alexander, Zahn, and Haselmann as a contaminant in the preparation, and these workers have identified the inner fibrous component as the The insoluble fraction subcuticle membrane. obtained from descaled fibres by this treatment is composed of many fibrils. This supports the conclusion of Zahn and Haselmann <sup>5</sup> that part of the cortex is more insoluble than the rest of the cortex. It has not been possible to show, from these photographs, from what part of the cortex this more resistant part is obtained; this question will form the subject of a forthcoming publication.

The authors are indebted to Mr. M. S. Moss and Dr. A. J. Hyde for useful discussions, and to the Bradford Dyers Association Ltd. for the award of a fellowship to one of them (B.M.).

CHEMISTRY AND DYEING DEPARTMENT TECHNICAL COLLEGE BRADFORD

(Received 10th December 1952)

#### References

- Alexander, P., and Earland, C., Text. Research J., 20, 298 (1950).
- <sup>2</sup> Blackburn, S., and Lowther, A. G., Biochem. J., 49, 554 (1951).
- <sup>3</sup> Alexander, P., Nature, 168, 1081 (1951).
- <sup>4</sup> Alexander, P., Zahn, H., and Haselmann, H., Text. Research J., 21, 236 (1951).
- <sup>6</sup> Zahn, H., and Haselmann, H., Melliand Textilber., 31, 225 (1950).
- <sup>6</sup> Gralén, N., Lagermalm, G., and Philip, B., Text. Research J., 21, 234 (1951).
- <sup>7</sup> Peacock, N., Sikorski, J., and Woods, H. J., Nature, 167, 408 (1951).
- <sup>e</sup> Elliott, R. L., and Manogue, B., J.S.D.C., 68, 12 (1952).
- Mercer, E. H., Nature, 168, 824 (1951).
- <sup>10</sup> Lindberg, J., Mercer, E. H., Philip, B., and Gralén, N., Text. Research J., 19, 673 (1949).
- <sup>11</sup> Lindberg, J., Philip, B., and Gralén, N., Nature, 162, 458 (1948).
- 12 Lindberg, J., Text. Research J., 19, 678 (1949).
- <sup>13</sup> Shuringa, G. J., and Algera, L., Biochim. et Biophys. Acta, 6, 325 (1950).
- 14 Mariner, P. F., Nature, 167, 231 (1951).
- <sup>16</sup> Williams, R. C., and Wyckoff, R. W. G., J. Appl. Phys., 18, 23 (1946).
- <sup>16</sup> Seeman, G., and Swerdlow, M., Text. Research J., 18, 536 (1948).
- 17 Makinson, K. R., ibid., 20, 22 (1950).
- 18 Hyde, A. J., Unpublished observations.



Fig. 1 — Photomicrograph of Resistant Fraction from Merino Wood after Peracetle Acid Ammonium Hydroxide Treatment Stained with methylene blue 2 100

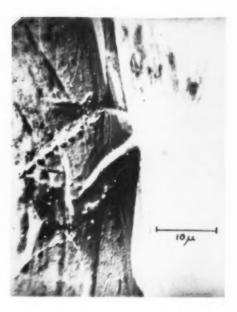


Fig. 2 - Electron Micrograph of Dryschlorinated Wood after Peracetic Acid Ammonium Hydroxide Treatment. On the right is a residue of a fibre, on the left a replica of a residue, A thin continuous membrane, the epicuticle, follows the contours of the scales A fragment of epicuticle, detached from a fibre, lies across the centre of the fleid

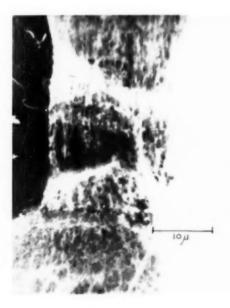


Fig. 3.—Electron Micrograph showing the Cuticle Sheath, thickened at scale edges. The dense region on the right is the inner fibrous component



Fig. 4 - Electron Micrograph of Part of the Cuticle Sheath



Fig. 5.—Electron Micrograph showing Epicuticle adhering to a Replica. The surface of the replica has a longitudinally ridged structure.



Fto. 6 - Photomicrograph of Resistant Fraction from Chlorzyme-treated Wood after Peracetic Acid-Ammonium Hydroxide Treatment, Stained with methylene blue 2 100



Fig. 7 = Electron Micrograph of Resistant Fraction of Chlorzyme-treated Wood

#### Zacharie Roussin

R. BRIGHTMAN

Roussin's contribution to the development of the field of azo dyes and to the recognition of the value of naphthalene as an industrial chemical is reviewed.

The seventh edition of Schultz and Lehmann's Farbstoff-Tabellen records the chemical constitution of some 1360 synthetic colouring matters, together with the names of 394 inventors 1. Analysing these data, my colleague Mr. W. A. Silvester has pointed out that only 35 of these inventors, alone or with collaborators, invented ten dyes each, and only 20 were inventors of fifteen or more dyes 2. For this latter category Zacharie Roussin, who was born 125 years ago, on 6th September 1827, at Grands-Moulins in the commune of Vieux-Vy (Ille-et-Vilaine), just fails to qualify. The thirteen dyes in Table I were discovered by him, either alone or with Poirrier or Rosenstiehl, and were marketed by A. F. Poirrier of Paris, a parent firm, with G. Dalsace, of the present Société Anonyme des Matières Colorantes et Produits Chimiques de Saint-Denis. With the exception of Orange No. 3. they appear in either the Farbstoff-Tabellen 1, the Colour Index 3, or both. Of these dyes, eight were still being imported into the United Kingdom in 1913, and one of the others, Xylidine Ponceau, was subsequently on the selling range of the British Dyestuffs Corporation as Ponceau Scarlet R.

#### TABLE I Dves discovered by Roussin

Dyes disco	vereu by	Kous	SHAR
			Year
Orange III			1875
Nacarat			1875
Orange I, II,	and IV		1876
Chrysoine		***	1876
Cerasine			1877
Orange No. 3			1878
Archil substitu	ite		1878
Xylidine Pone	eau 3RS		1878
Cureumein		***	1878
Metanil Yellov	w, bromin	ated	1882
Yellow, fast to	808D		1883

All these dyes are of the monoazo type, and are characterised by the presence of sulphonic acid groups, either in the diazo component or in the coupling component, and this represents Roussin's great contribution. A provisional British Patent Specification of W. H. Perkin, in April 1863, described an orange dye from sulphonated a-naphthylamine 4, and Perkin, in his presidential address to the Society of Chemical Industry in 1885, claimed that "the first use of the sulpho group in relation to azo colours was in connection with amidoazonaphthalene, patented by myself in 1863" 5. I am not satisfied, however, that Perkin's claim is entirely justified. In a list of products manufactured by Perkin & Sons at the Greenford Green factory 1857–1873, supplied by Sir William Perkin to Professor R. Meldola, and quoted by the latter in his presidential address to this Society in

1908 6, aminoazonaphthalene is included and said to be used in a finely precipitated form as an orange, red, or searlet pigment for calico printing but not largely. There is no mention, however, of the sulphonated product, and Roussin's dyes were in fact the first azo compounds capable of general application in dyeing. The aniline yellow of Dale and Caro and the chrysoidine of Caro and Witt are insoluble, and were used chiefly in colouring lacquers and waxes and on tannin-mordanted cotton respectively, and the Bismark or Manchester Brown of Martius, Dale, and Caro was exclusively used as a basic dye on cotton. Up to the Spring of 1877, as H. Caro pointed out in his lecture on the development of the coal-tar dye industry 7, quoting from a paper of Witt's in May 1877 ", it was believed that the azo group could give only yellow shades to molecules containing it. Roussin's dyes dispelled this idea. Two of them, Roccellin (Cerasine) and Orange II, represent the first use of  $\beta$ -naphthol as a coupling component, and Roccellin (Fast Red A) is the oldest of the red azo dyes. Caro himself described them, especially the oranges, as the new products for which the dyers had long been waiting?, and it should also be noted that, with the exception of Martius Yellow (2:4-dinitronaphthol) and the azo dye, Magdala Red, they represent the first use of naphthalene compounds in dye manufacture: naphthazarin, also discovered by Roussin as early as 1861, and at first confused with alizarin, had taken no important place in dyeing and printing. As Caro pointed out 7, it was only after the discovery of the phthaleins and the introduction of the use of  $\beta$ -naphthol in the manufacture of azo dyes that naphthalene ceased to be regarded as a waste product in chemical industry and burnt for soot or used as fuel.

The recognition of the value of naphthalene as an industrial chemical thus really starts from Roussin's work. Commencing in 1861, investigations on mono- and di-nitronaphthalene and naphthylamine, in which he described improved processes for their preparation 10, and extensive studies of the reactions of dinitronaphthalene with numerous substances such as stannous salts, alkali-metal cyanides and sulphides, and of the action of nitric acid and potassium nitrite on naphthylamine in the hope of obtaining coloured products 11, in the course of which he anticipated Beilstein (author of the well known Handbuch) by two years in the use of tin and hydrochloric acid to effect rapid reduction of nitro compounds, led Roussin to the discovery of naphthazarin already noted.

Then for twelve years his duties as a military pharmacist and as Professor of Agriculture at the Collège de Val-de-Grace interrupted his studies on colouring matters derived from naphthalene. They were only resumed in 1874, when he was Principal Pharmacist (13th March 1873 to 3rd February 1875) at the military hospital of Lyons. It is interesting to note that, just as Peter Griess' investigations of the diazo compounds were largely a spare-time activity while he was employed as chemist to Allsopp's brewery in Burton-on-Trent, so this outburst of activity of Roussin came towards the end of his thirty years' service in the French Army, while he was still Principal Pharmacist at the military hospital at Gros-Caillou, Paris (3rd February 1875 to 20th April 1876).

It does not appear that at any time was Roussin employed in a dye factory, though he was friendly with Poirrier and received much encouragement from him and his colleague Rosenstiehl, who was from 1877 to 1888 manager of Poirrier's works 12, afterwards, however, confining his interest to research. Poirrier began the manufacture of azo dyes by Roussin's processes in his St. Denis factory in July 1875. By 12th April 1876 Roussin had supplied Poirrier with details for the preparation of eighteen new azo dyes, including the well known oranges, the red Nacarat (originally named Amelia Red after his wife and now known as Carmoisine), which was the first azo dye made entirely from naphthalene derivatives. Roussin's oranges were being sold by Poirrier by the middle of 1877, and were also marketed as the Tropaeolins in this country by Williams, Thomas & Dower at Brentford and Fulham a little earlier. The priority of all these dyes is by no means clear, Roussin's claims arising from the sealed communications (plis cachetés) which he deposited with the Académie des Sciences, Paris, the Société Industrielle de Rouen, or the Société Industrielle de Mulhouse, some of which were not opened for thirty years.

It should be remembered in this connection that the patent law situation in Europe was then very different from that of the twentieth century. Of the industrial countries only France, Belgium, Great Britain, and Italy had patent laws in force: the Netherlands had abandoned in 1869 an earlier patent law of 1819, while up to 1877 most of the separate German states, such as Prussia, Bavaria, Württemberg, Saxony, had their own separate patent laws, all different. These were consolidated by the Reich patent law of 1877, which was subsequently replaced by that of 1891 13. The Swiss patent law dates only from 1907.

The device of sealed communications favoured by Roussin is to be considered against this background. It was an attempt to establish priority of discovery for the inventor without disclosing to others the details of an invention which they would then be able to exploit independently. Since effective patent protection in Switzerland and in Germany could not be obtained, or only with difficulty, the practice of secret working was encouraged, and the sealed communication was the inventor's means of obtaining credit and, if necessary, some legal standing for priority, even though, of necessity, at a much later date. Roussin's sealed communications, for instance, were only opened ten years or more later.

It may be mentioned that the Society of Dyers and Colourists has a similar scheme 14. Any person may deposit an envelope containing his paper, which envelope shall be enclosed in a second envelope to be sealed in the presence of the Society's officers. The person depositing such a communication may withdraw it at any time or leave it for seven years, at the end of which period it may be either opened and submitted to the Society's Publications Committee or handed back to him. The aim of the scheme was essentially to facilitate a claim to priority for the work described, which often was not patentable. A man's employers might have stipulated that he was not to publish until a certain period had elapsed, and here the sealed communication system enabled him to prove the date of his work even though publication was delayed for years. Where it was not considered advisable to apply for a patent, lodging a sealed communication would be proof of the work undertaken if someone else attempted to patent the process described.

This procedure may partly explain why Roussin has not always been given his full credit for opening up the azo dye field. As already noted, W. H. Perkin overlooked Roussin  $^5$ . R. J. Friswell in 1880, in a paper  $^{15}$  on recent developments in which he described a new scarlet obtained from xylidine and  $\beta$ -naphtholdisulphonic acid, which was stressed by Mr. Spiller, of Messrs. Brook, Simpson & Spiller, as providing a much needed outlet for naphthalene, "a perfect bugbear in scientific industry", also was silent on Roussin's contribution, and the omission was not corrected by either H. E. Armstrong or Meldola, who were present.

Meldola, in 1886, in discussing the scientific development of the coal-tar industry 16, omitted to mention Roussin's name, and attributed to Caro and Witt's discovery of chrysoidine or diaminoazobenzene the great impetus to the technical development of azo colouring matters from 1875 onwards. Similarly, Green, in 1901, reviewing before the British Association relative progress in England and Germany during the preceding fifteen years 17, referred solely to Böttiger's discovery of Congo red in 1884 and the development of the direct cotton dyes, but discounted the earlier discoveries of azo dyes and of the basic or acid wool dyes. H. E. Roscoe, however, in a discourse to the Royal Institution in 1886, had given Roussin the just credit, with Poirrier of Paris, of "having first brought into the market some of the beautiful azo derivatives of naphthol". He added 18-

Griess, therefore, as the original discoverer of the typical compounds and reactions by which the azo colours are obtained, may be considered the grandfather, whilst Roussin and Witt are really the fathers, of the azo-colour industry.

To this verdict may be added that of P. Lemoult, in an article on French chemists of the nineteenth century, published in connection with the Universal Exhibition of 1900 <sup>19</sup>—

Z. Roussin mérite une mention toute spéciale en raison de l'importance considérable et cependant assez peu connue de ses travaux et de ses découvertes en matières colorantes, indépendamment de ses autres productions. Roussin est en effet l'inventeur des matières colorantes azoïques dérivées d'amines substituées, telles que amines sulfonées, nitrées, etc. (1875-76); le premier exemplaire en est le rouge Amélie, obtenu par l'action de l'acide nitreux sur l'acide naphtionique, suivie immédiatement d'un grand nombre d'autres: Orange II, Orange III, Orange IV (1876); Rocceline (1877); substitut d'Orseille; etc.

Comme conséquence de ces découvertes, il faut citer la multitude des colorants azoïques de même nature que l'on fabrique aujourd'hui dans toutes les usines spéciales et qui représentent à eux seuls la moitié de la fabrication totale des colorants; il serait trop long de les énumérer, mais il faut appeler l'attention sur ce point ainsi que sur un autre point également méconnu, la découverte des colorants substantifs, c'est-à-dire teignant directement le coton; le premier exemplaire fut trouvé par Roussin (avril 1880), en se servant du tetrazoïque de benzidine. Cette découverte a été, depuis, l'origine d'un nombre considérable d'autres découvertes industrielles qui ont contribué à créer une industrie nouvelle, celle de la teinture du coton non mordancé.

As has already been pointed out, the priority for the discovery of some, at least, of these new azo dyes is not always quite clear. Others besides Roussin were working independently; in addition to Griess and Caro there was O. N. Witt, then a young man of twenty-three, who had just entered the Brentford works of Williams, Thomas & Dower. Witt was in touch with both Griess and

Caro, and followed his own discovery of chrysoidine in January 1876 with that, independently of Roussin, of the series of acid azo dyes which Williams, Thomas & Dower marketed under the name Tropaeolins. Witt, moreover, was already developing ideas on the relation between the chemical constitution and the colour of organic compounds, and the well known paper under that title in which the ideas of the chromophore and auxochrome were first advanced appeared in 1879 2, by which time Witt, himself, was working with L. Cassella & Co. at Frankfurt-am-Main.

Nevertheless, despite this independent work, Roscoe's judgment of Roussin is substantially true, and it is a little surprising that to-day his contribution is often overlooked. In preparing his paper on the wool dyes for the Society's Conference at Harrogate in 1951, the late James Baddiley was particularly anxious to do justice to the memory of Roussin <sup>21</sup>. Had he seen Balland and Luizet's book on Roussin <sup>19</sup>, he would not have referred to Caro's Fast Red without indicating that Roussin discovered this independently in 1877, and that, in fact, under the name Cerssine, this dye, like Xylidine Ponceau, was marketed by Porrier several years before the German firms were selling Fast Red A and Ponceau 2R. Table II may make the position a little clearer.

TABLE II
Priority Claims for Azo Dyes

			a riority Commission to read by	6.0		
Colour Index <sup>3</sup> No.	No.	Names Names	Constitution	Date of Roussin's Discovery	Rival Claims and Dates	Patent References
150	185	Orange I	Sulphanilie acid $\rightarrow a$ -Naphthol	May 1876	Griess 1876 Witt 1876	
151	189	Orange II	Sulphanilie acid $\rightarrow \beta$ -Naphthol	June 1876	-	-
142	176	Orange III	Sulphanilic acid -> Dimethylaniline	1875	Griess 1875 Witt 1876	_
-	-	Orange No. 3 22	$m\text{-Nitroaniline} \! \to \! \mathbf{R} \text{ acid}$	1878	-	BP 4490 (1878), FP 127,221
143	179	Orange IV Tropaeolin OO Acid Yellow (the first acid dye)	Sulphanilic acid→Diphenylamine	1876	Witt 1876	BP 4491 (1878)— Roussin and Poirrier 6 Nov.
148	186	Chrysoine Resorcine Yellow	Sulphanilic acid Resorcinol	June 1876	Witt 1876 Griess 1875	
176	206	Roccellin Fast Red A Cerasine	Naphthionic acid $\rightarrow \beta$ -Naphthol	1877	Caro 1877	BP 786 (1878)— Caro 25 Feb.
46	62	Archil substitute	$p\text{-Nitroandine}\!\to\! \mathrm{Naphthionic}$ acid	1878		BP 4490 (1878)— Roussin and Poirrier 6 Nov.
79	95	Xylidine Ponceau 3RS	$m$ -Xylidine $\rightarrow$ R acid	1878	Baum 1878	BP 1715 (1878)— MLB FP 127,220
179	208	Nacarat Carmoisine (Amelia Red)	Naphthionie acid→N.W. acid	June 1875	Witt 1883	BP 2257 (1883)
217	-	Yellow fast to soap	m-Aminobenzoic acid→ Diphenyl- amine	1883	Rosenstiehl 1884	BP 4621 (1883) Roussin and Rosenstiehl FP 157,755
162	197	Fast Yellow N (Curcumein, Orange N)	Toluidinesulphonic acid → Diphenyl- amine	1878		PP 4491 (1878) FP 127,220
139	170	Metanil Yellow, brominated	Metanilic acid → Diphenylamine (brominated)	1882		BP 5696 (1882) FP 140,114

The most important of Roussin's sealed communications were deposited with the Académie des Sciences in June to November 1875, and were opened only in February 1907 23. They described the preparation of Amelia Red, as well as a simple process of obtaining naphthionic acid by sulphonating  $\alpha$ -naphthylamine with ordinary sulphuric acid. Others, deposited with the Société Industrielle de Rouen in May and June 1876 24, described Orange I and Orange II, and those deposited with the Société Industrielle de Mulhouse in June 1876 described resorcinol yellow, or chrysoine 25. It was only when in July 1877 A. W. von Hofmann published the constitutions of Orange I and Orange II 26, and the first patents in the azo dye field in Germany began to be taken out under the new Reich patent law 27, that Roussin and Poirrier themselves began to patent Roussin's discoveries. Together and with Rosenstiehl, they obtained three British and four corresponding French patents covering Orange IV and Curcumein, Archil Substitute, Metanil Yellow brominated, Yellow fast to soap, Xylidine Ponceau, Orange No. 3, and Orange III 28. A further French patent, of 4th November 1878, described 29 the preparation of dyes derived from "phthalamine" the name they gave to an impurity present in crude naphthylamine which yielded a soluble sulphonic acid. By coupling metanilic acid in place of sulphanilic acid with diphenylamine, Roussin obtained a new yellow for dyeing paper, Yellow M or Metanil Yellow, which on bromination gives Yellow C (C.I. 139), the manufacture of which was covered by patents 30. Use of p-toluidinesulphonic acid in place of metanilic acid gave him Yellow N. In a further patent, of 4th December 1887, he described 31 the conversion of Witt's a-naphthylaminesulphonic acid 32 to the corresponding naphtholsulphonic acid and a series of monoazo dyes obtained by coupling this with diazo compounds.

Apart from this, Roussin continued to publish his work in the dye field in a series of sealed communications. In January 1878, for instance, by nitrating diphenylamine he obtained the yellow dye Aurantia, which Kopp had obtained in 1874 <sup>33</sup>. He also obtained a new red by sulphonating Roccellin, and later by nitrating Orange IV he obtained Indian Yellow and Citronine, which were marketed by Poirrier and other firms <sup>34</sup>.

Roussin had some claims to be considered the first to use benzidine as a source of azo dyes. A letter of Roussin's to Poirrier dated 8th April 1880 described a violet obtained from benzidine which dyed cotton direct without mordants. This was four years before Böttiger introduced his Congo Red. He had also some claims to be considered one of the originators of Para Red. A paragraph in his French Patent 127,221 on 30th October 1878 <sup>28(b)</sup>

En imprégnant un tissu d'une solution aqueuse du dérivé diazoïque de la nitraniline, puis en immergeant ce tissu dans une solution aussi faiblement alcaline que possible de naphtol alpha ou bêta, on colore le tissu en rouge. Cette opération peut se répéter de la même manière, sur le même tissu, jusqu'à ce qu'on atteigne le ton convenable.

This idea was elaborated further in 1888 in a sealed communication and in a French patent <sup>35</sup>. It would appear, accordingly, as D. Luizet pointed out  $^{36}$ , that Roussin was the first to use the azo derivatives of the aromatic nitroamines, that he was the first to suggest applying them in dyeing by development on the fibre, notably on cotton, and that in 1878 he recommended for this the use of the diazo derivative of p-nitroaniline and  $\beta$ -naphthol. The French patent  $^{35}$  appears to be a sequel to Poirrier's request to Roussin in a letter of 13th June 1888—

Un certain nombre de teinturiers à qui nous avons soumis vos échantillons, obtenus par le développement de la coloration sur le tissu, s'y intéressent à cause de la solidité au savonnage; quelques-uns voudraient faire des essais au plus tôt. Je viens donc vous prier de bien vouloir faire bréveter votre procédé et nous autoriser à l'offrir.

Besides being the first to use benzidine for direct cotton dyes, Roussin discovered a number of disazo dyes of the straight-chain type. A sealed communication of 1886, for example, describes  $^{37}$  a bluish-violet dye, Indigo Blue, obtained by coupling p-toluidinesulphonic acid with  $\alpha$ -naphthylamine, and diazotising and coupling with R salt, and other dyes of the same type. One British and three French patents cover other disazo dyes of the same type  $^{38}$ . A British patent  $^{39}$  for yellow, orange, red, and violet azo dyes from the alkaline reduction products of dinitrobenzil and diazotisation is attributed to Roussin as well as to Poirrier and Rosenstiehl  $^{40}$ .

These achievements of Roussin in the dye field are thus all the outcome of either the last few years of his service as pharmacist in the French Army. which he left in October 1879, or of his return to civil life, and his services were recognised by the award to him in 1887 of a prize of 3000 francs by the Société pour l'Encouragement de l'Industrie Nationale for his utilisation of naphthalene. They represent, however, only a small part of Roussin's scientific work, for he was also responsible for many investigations in the field of toxicology and in organic and inorganic chemistry. After early education at Fougeries he studied pharmacy under Destaudes at Rennes, where he became demonstrator in chemistry, and in 1848 he went to Paris, qualifying as a pharmacist in 1852 and entering the army in the same year. In 1857 he returned to Paris to the Collège de Val-de-Grace, becoming professor of chemistry and toxicology there in 1858, and at the same time a member of the Council of the newly founded Société Chimique de Paris. It was at this period that he began his researches on naphthalene, as already noted, but in 1863 he returned to military service, and was deputy director of the Army Central Pharmacy at the time of the Franco-Prussian War, serving in Paris throughout the siege, but being arrested during the Commune in 1871. On the fall of the Commune he was released, and in March 1873 was appointed principal pharmacist at the Military Hospital at Lyons, from which he moved to a similar post at Gros-Caillou in April 1875. On leaving the army, Roussin carried on his researches in a laboratory in the rue de Grenelle, where he continued to work until his death on 8th April 1894.

Among the more important of Roussin's miscellaneous researches was his discovery and study of the nature of the sweetening principle of the liquorice root, which he described in a long paper published in 1875 41.

The only obituary notice of Roussin which I have been able to trace is one by L. G. Toraudi which was published almost a quarter of a century after his death 42. Most of the facts regarding the life and scientific work of Roussin, however, have been taken from a full biography of Roussin published some ten years previously 19, one of the authors of which, D. Luizet, was himself a chemist with the Poirrier firm. This book contains the text of Roussin's scientific papers, patents, and plis cachetés, and from this source I have taken the quotations from Roussin's letters and Lemoult's appreciation 19.

In a paper published after the present paper was written, Justin-Mueller 43 attributes to "François-Zacharie" Roussin and Troost, in 1860-61, the preparation and use for dyeing of the first sulphur dye, in particular of the type obtained subsequently, in 1893, by René Bohn and marketed as Fast Black B.

\* \* I am indebted to Mr. W. A. Silvester for helpful suggestions.

IMPERIAL CHEMICAL INDUSTRIES LTD.

DVESTUFFS DIVISION HEXAGON HOUSE

MANCHESTER 9 (Received 14th October 1952)

#### References

- <sup>1</sup> Schultz, G. (revised by Lehmann, L.), Farbstofftabellen (7th edition 1931-1939, Leipzig: Akademische Verlagsgesellschaft m.b.H.).
- <sup>2</sup> Silvester, W. A., What Industry owes to Chemical Science (3rd edition 1945. Cambridge: W. Heffer & Sons
- Ltd.), p. 125.
   Rowe, F. M., Colour Index (Bradford: Society of Dyers and Colourists 1924).
- Perkin, W. H., Provisional BP 859 (4 April 1863).
   Idem, J.S.C.I., 4, 935 (1885).
- <sup>6</sup> Meldola, R., J.S.D.C., 24, 104 (1908).
- <sup>7</sup> Caro, H., Ber. dtsch. chem. Ges., 25, [Referate] 1090 (1892).

- \* Witt, O. N., ibid., 10, 876 (1877).
- <sup>9</sup> Roussin, Z., Compt. rend. Acad. Sci. Paris, 52, 1033 (1861)
- <sup>10</sup> Idem, *ibid.*, **52**, 496, 796, 968 (1861).

  <sup>11</sup> Idem, *ibid.*, **52**, 1145, 1177 (1861).

- Idem, ibid., 52, 1145, 1177 (1861).
   Haller, A., Bull. Soc. chim., [iv], 21, i-xxiv (29 Aug. 1917).
   Cf. Caro, H., Iac. cit., pp. 1091-1092.
   J.S.D.C., 69, 2 (Jan. 1953).
   Friswell, R. J., J. Soc. Arts, 28, 444 (1880).
   Meldola, R., ibid., 34, 759 (1886).
   Green, A. G., Rep. Brit. Ass., 254 (1901).
   Gardner, W. M., The British Coal Tar Industry (London: Williams & Norgate, 1915), p. 115.
   Balland, A., and Luizet, D., Le Chimiste Z. Roussin
- 19 Balland, A., and Luizet, D., Le Chimiste Z. Roussin (Paris: J. B. Baillière et Fils, 1908), pp. 305-307.
- 20 Witt, O. N., J.C.S., 35, 179 (1879).
- Baddiley, J., J.S.D.C., 67, 547 (1951).
   Listed by Hurst, G. H., Dictionary of the Coal Tar Colours (London 1896).
- Colours (London 1830).
   Roussin, Z., Acadêmie des Sciences, Plis cachetés 2916 (6 June 1875), 2919 (27 June 1875), 2933 (24 July 1875), 2964 (15 Nov. 1875), 2990 (22 March 1876).
   Idem, Société Industrielle de Rouen, Plis cachetés 13
- (14 May 1876), 27 (13 July 1877).

  25 Idem, Société Industrielle de Mulhouse, Plis cachetés 229
- (5 June 1876), 230 (5 June 1876).
- <sup>36</sup> Hofmann, A. W. von, Ber, dtsch. chem. Gen., 10, 1378 (1877)

- <sup>27</sup> See also Caro, H., loc. cit., p. 1091. <sup>28</sup> (a) FP 127,220, BP 4491 (6 Nov. 1878); (b) FP 127,221, BP 4490 (6 Nov. 1878); (c) FP 152,376; (d) FP 157,755;
- 29 FP 127,266, BP 4621 (28 Sept. 1883).
- <sup>26</sup> Roussin, Z., FP 140,114, BP 5696 (1882).
- <sup>31</sup> Idem, FP 187,477.
- <sup>22</sup> Witt, O. N., Ber. dtsch. chem. Ges., 19, 578 (1886).
- 33 Roussin, Z., Soc. ind. Mulhouse, Pli cacheté 259 (28 Jan. 1878)
- 34 Balland and Luizet, op. cit., p. 72.
- <sup>35</sup> Roussin, Z., Soc. ind. Rouen Pli cacheté 194 (27 May 1888); FP 191,808 (13 July 1888),
- 38 Balland and Luizet, op. cit., p. 78.
- 37 Roussin, Z., Soc. ind. Rouen, Pli cacheté 136 (15 April
- 1886).

  88 BP 9257 (29 June 1887), FP 184,501, 184,524, 185,918.
- 29 BP 9414 (2 July 1887).
- J.S.C.I., 7, 432 (1888).
   Roussin, Z., J. Pharm. Chim., [iv], 22, 6 (1875); Mém. Méd., Chir. Pharm. mil., 31, 392 (1875).
- 42 Toraudi, L. G., Bull, Sci. pharm., 25, 25-38 (March-April 1918).
- 43 Justin-Mueller, E., Teintex, 17, 577 (Sept. 1952).

#### CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents

#### Particle Size in Vat Dyeing

I have read Mr. Flanagan's paper 1 and appreciate the vast amount of work involved. May I say that his experience is different from mine in the influence he attributes to particle size? His work has been done under ideal conditions, which are not available to the commission dyer. His work was done on undried cakes which have not been subjected to drying, packing, and transport. The handling necessary during these stages inevitably deforms the cakes to varying degrees depending on the operator. My experience has been on dried and transported cakes only.

The most vital factor in all viscose rayon cake dyeing is the permeability of the cakes: no two cakes are identical in their permeability.

I claim that a levelling agent for vat dyes with as quick a strike as Caledon Blue RC (ICI) has not

yet been marketed. Retardation of strike and levelling are entirely different processes, but are frequently confused as similar. A levelling test should be made by treating a dyed skein of the dye and an undyed skein in a blank reduction bath plus the appropriate amount of product under test, temperature and time of working to be those of the normal dyeing procedure. I have frequently challenged makers of alleged levelling agents to produce their evidence by such a test. but none has ever been produced.

Flanagan agrees that very poor migration is obtained with vat dyes of rapid strike (Fig. 1. Surely, then, even distribution of the p. 23)1. unreduced vat pigment through the cake is the dominant factor. Even pigmentation can be obtained with small particle size as laid down by Hampson 2: this requires a close study of each individual dye for aggregation behaviour. I agree that particle size with vat dyes of slow strike is unimportant; also that unidirectional flow is sufficient. Until a true levelling agent is marketed, particle size is, in my opinion, the dominant factor with dyes of rapid strike.

The start of Hampson's work was due to the observation that one delivery of Caledon Blue RC gave outstandingly superior bulk results. Investigation revealed a much finer particle size. After much work, ball-mill grinding in the dyehouse to Hampson's optimum size so increased the confidence of the supervisory dyers that they prefer to dye viscose rayon cakes with vat dyes rather than with direct cotton dyes—surely the most convincing evidence of the dominating influence of particle size in vat dyes with a rapid strike.

In Table IV (p. 21) one finds the same chemical compound classified in two different groups for level dyeing on viscose rayon cakes—

Class 2 ... Caledon Blue RC 300 Powder Fine Class 4 ... Paradone Blue RC Paste

It is stated that 2.5 g. of each dye was taken; clearly the depth of shade must have been different, and the test not exactly comparative. I suggest that variation in the cake permeability or in particle size was the cause of the varying classification of the same chemical compound: it could not lie in the levelling property of the same chemical compound.

C. M. WHITTAKER

1 Weaponness Park Scarborough 3rd February 1953

In reply to Dr. Whittaker I would point out that Hampson in his paper (p. 372) <sup>2</sup> classified vat dyes into three classes according to their suitability for application to viscose rayon cakes. This classification was based on the particle size of the vat pigment. Dyes of large particle size, even though of good migration and strongly restrained in the leuco state, were classified as yielding very poor results. In my paper <sup>1</sup> I have shown that dyes of large particle size can give level results, and Dr. Whittaker agrees that particle size is unimportant

in the case of vat dyes of slow strike. If the even distribution of the unreduced vat pigment were the dominant factor in cake dyeing would it be logical to promote restraining at the leuco stage by the introduction of Dispersol VL?

With regard to Caledon Blue RC, I did state in my paper (p. 23) <sup>1</sup> that with dyes of this type level pigmentation assumes a more important rôle. This could account for the fact that the Caledon and Paradone Blue RC appear in different classes in Table IV. By duplicating the experiments the effects of variations in cake permeability were minimised.

Variations in permeability do occur from one cake to another, as Dr. Whittaker states, and this is true for dried or undried cakes. However, I have no evidence that pigment padding is likely to be more efficient on a dried cake, or that the rate of strike is reduced or levelling promoted when using undried cakes. As reported on p. 22 of my paper i, one series of experiments was carried out on dried and undried cakes in an enclosed machine, and no significant difference was found between the two kinds of yarn.

I quite agree that retardation of strike and levelling are two different processes, and I think that this is made quite clear in the text. I also agree that the test for levelling should be as described by Dr. Whittaker. This is very similar to the one which was used for all such tests throughout the work, and referred to on p. 23.

Dr. Whittaker seems to have misinterpreted the data given in Fig. 1 and referred to in the text on p. 23. The text reads: "It will be seen from Fig. 1 and 2 that with the non-level-dyeing dyes migration is very poor". No reference is made here to the rate of strike in relation to migration. Of the three non-level-dyeing dyes mentioned it will be seen from Table VII that only one, viz. Caledon Blue XRCS, has a rapid strike in the presence of Dispersol VI.

T. FLANAGAN

British Enka Ltd. Aintree Liverpool 9

23rd February 1953

<sup>1</sup> Flanagan, T., J.S.D.C., 69, 18-23 (Jan. 1953).

<sup>3</sup> Hampson, H., ibid., 67, 369-375 (Oct. 1951).

#### Notes

Proceedings of the Council

At a meeting of the Council held at the offices of the Society, 19 Piccadilly, Bradford, on 11th March 1953, the proceedings included the following items of interest—

First London Lecture—It was unanimously resolved that the hearty congratulations of Council be conveyed to the London Section on the success of their first London Lecture, held on 6th March 1953. Mr. H. H. Bowen and Mr. J. Barritt reported that a very interesting address by Sir Ernest Goodale had been illustrated by a magnificent display of textiles.

B.S.I. COMMITTEE ON CHEMICAL PRODUCTS—It was decided to decline an invitation to nominate a

representative on Technical Committee HCC/6—Methods of Test for Chemical Products—of the British Standards Institution, since the work of this committee would not be of direct concern to the Society.

Index to 1952 Journal.—It was resolved that the congratulations of Council be conveyed to Mrs. E. G. Thomson for her work in preparing the Index in time for circulation with the February 1953 issue of the *Journal*.

MEMBERSHIP—Seventeen applications for ordinary membership and six for junior membership were approved.

NOTES 121

RETIRING MEMBERS OF COUNCIL—The President expressed his very best thanks for the wonderful work and support of the retiring Vice-presidents and Ordinary Members of Council.

Retiring President—The Honorary Secretary (Mr. J. Barritt) expressed thanks to Mr. H. H. Bowen for all that he had done for the Society, and Mr. F. L. Goodall said that he had greatly benefited from serving under Mr. Bowen.

#### Meetings of Council and Committees March

Council-11th

Publications-17th

Fastness Tests Co-ordinating -- 26th

Textile Printing Symposium-12th

#### Recommended Definitions

The Terms and Definitions Committee is grateful to those who have sent in comments on its tentative definitions, and now puts forward the following recommended definitions, based on the tentative definitions already published—

#### 4. COLOUR VALUE

The ratio between the costs of the dyes yielding dyeings of equal visual strengths.

Note—In printing this term is synonymous with tinctorial value (below).

#### 5. TINCTORIAL VALUE

The intensity of colour obtained when a standard weight of dye is applied to a substrate under specified conditions.

#### 6. EXHAUSTION

The ratio at any stated stage between the amount of dye or other substance taken up by the substrate and the amount originally available.

#### 7. RATE OF DYEING

The rate at which a standard weight of dye is absorbed by a standard weight of substrate under specified conditions. It may be expressed quantitatively in several ways, such as the weight of dye absorbed in unit time, the percentage of dye absorbed in unit time, or the time taken for the substrate to absorb a given fraction of the amount of dye which it will absorb at equilibrium.

#### 8. DISPERSE DYES

A class of water-insoluble dyes originally introduced for dyeing cellulose acetate, and usually applied from fine aqueous suspensions.

#### **Tentative Definitions**

The Terms and Definitions Committee will welcome comments on the following tentative definitions—

#### 25. DYE

A substance which is applied to any body to bring about a persistent modification of the original colour, and which, in some forms of its application, can be dissolved or dispersed in a fluid, diffusing thereby into the body to be coloured.

#### 26. PIGMENT

A substance is particulate form which is applied to bodies by mechanical incorporation or by coating to modify their colour and light-scattering properties.

#### B.S. 1006: 1953

#### Fastness to Daylight of Coloured Textiles

Part 1 of this revised British Standard prescribes the method of test, and is essentially the version published by the Society's Light Fastness Subcommittee (J.S.D.C., **68**, 197 (June 1952)). It may be purchased from the British Standards Institution, Sales Branch, 24 Victoria Street, London S.W.1, price 2s. 6d. Part 2 consists of eight individual reference standards each measuring 10 in. × 6 in. and costing 5s. 0d.

#### Imperial College of Science and Technology

The Government has authorised the expansion of Imperial College in accordance with its policy of establishing at least one technological institution of university rank. It is intended that the number of students shall be nearly doubled, to 3000, by 1962, and the college will have first claim on land that becomes available adjoining its present site in South Kensington, London S.W.7.

#### A.A.T.C.C. 1953 Convention

A preliminary invitation has been published to contribute technical papers at the National Convention of the A.A.T.C.C., to be held in Chicago, Illinois, on 17–19th September 1953. The title of the proposed paper should be sent as soon as possible to the Convention Technical Program Chairman, Elliott Morrill, e/o Best Foods Inc., 1437 West Morris Street, Indianapolis 6, Indiana, U.S.A., and if accepted the complete paper must be in his hands by the first week in August.

#### Endeavour Prizes for Science Essays

Prizes up to 50 guineas are to be awarded by ICI to competitors below the age of twenty-five years for an essay on "Colour and Chemistry", "Scientific Societies and their Rôle", or one of six other subjects, to be sent in by 1st June 1953. Further details can be obtained from the Assistant Secretary, British Association for the Advancement of Science, Burlington House, Piccadilly, London W.1.

#### International Congress in Lucerne

The International Federation of Associations of Textile Chemists and Colourists will hold its first post-war congress in Lucerne during 17—19th September 1953. Detailed arrangements are in the hands of the Swiss association (S.V.C.C., St. Gallen, Unterstrasse 11, Switzerland).

#### The French Dve Industry 1

The increase in annual production is shown by the following figures—

Prior to 1914	***	***	1,000 tons
1919-1921 (average)			7,000 tons
1937-1939 (average)		***	11,500 tons
1949-1951 (average)			14,500 tons

Home consumption is divided as follows—textiles 70%, leather and fur 10%, paper 7%, paints, lacquers, and varnishes 4%, miscellaneous 90%.

<sup>1</sup> Sack, E. A., Teintex, 17, 677-689 (Nov. 1952).

#### Conference on Particle Size Analysis

A conference on "The Physics of Particle Size Analysis" is to be held in the University of Nottingham during 6-9th April 1954. Further details may be obtained from the Institute of Physics, 47 Belgrave Square, London S.W.1.

#### Scientific Literature of the Soviet Bloc and China

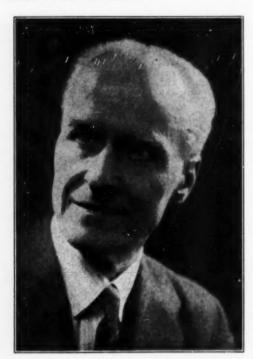
It is reported that the Zentralstelle für wissenschaftliche Literatur, Berlin N.W.7, Unter den Linden 8, publishes a number of bibliographical guides to scientific literature emanating from the communist countries. They include—Bestell-katalog der Meshdunarodnaja Kniga in deutscher Übersetzung, which generally indicates the contents

of Soviet books available for purchase; Neuerscheinungen wissenschaftlicher Literatur aus den Ländern der Volksdemokratie und der Volksrepublik China, which appears fortnightly, and gives a good review of the most recent literature of these countries; and Inhaltsverzeichnisse sowjetischer Fachzeitschriften in deutscher Übersetzung, which gives German translations of titles of papers appearing in recent issues of Soviet technical periodicals.

#### OBITUARY NOTICE

#### Louis Amédée Lantz

L. A. Lantz died in Switzerland on February 3rd in his sixty-sixth year, after a brief retirement. He was a native of Alsace, and although he spent twenty-eight years of his life in England he remained a French national.



Holding the qualification of Ingénieur-Chimiste of the École de Chimie de Mulhouse, he became a chemist at the Zundel printworks in Russia in 1908. It was at these works that the discovery had been made some four years earlier of the stabilised reducing agents, by the introduction of formaldehyde into the old type of discharge mixture.

The culture which existed in Moscow at that time appears to have had a considerable influence on Mr. Lantz, inspiring him with a life-long interest in the arts, including painting and the ballet. It was during this period of his life that he married a talented Russian lady.

On the outbreak of the revolution he returned to France, but in 1923 came to England, where he was continuously employed in the textile printing industry. He has a large number of publications to his credit, including a series in France on oxidation colouring matters. In this country he was prolific in the patents field and there are at least twenty-five in the name of the Calico Printers' Association Ltd., L. A. Lantz, and others. Many of these relate to the use of synthetic resins in stabilising fabrics, fixing dyes, or enhancing the beauty of fabrics. In addition he was deeply interested in biology and attained some eminence in this science.

During the last war, Mr. Lantz served the Allied cause in a very direct manner, being the personal representative in Manchester of General de Gaulle. Not only did this entail considerable administrative responsibility but he entertained many young French people who came over to this country and gave them renewed hope by his steadfast belief in ultimate victory.

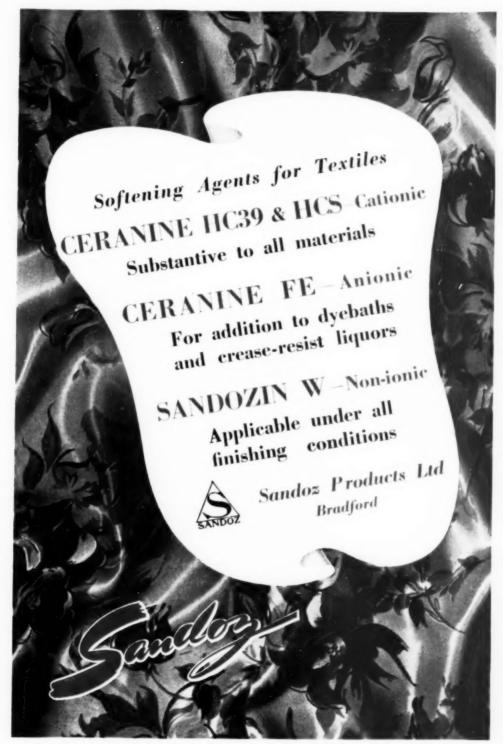
In the Society the name of L. A. Lantz will long be remembered whenever fastness tests are mentioned. He was a member of the original Fastness Tests Committee set up in 1927, which examined and in 1934 reported on the fastness of coloured textiles to light, washing, and perspiration. For his part in this work he was awarded the Silver Medal of the Society during the latter's Jubilee celebrations.

In the same year he became the Chairman of the Fastness Tests Committee, an office which he held until shortly before his retirement. In 1944 the work of the committee was directed towards the setting up of a full range of fastness tests, and details of these were published in 1948 and in amended form in 1950. The issue of these tests did much to enhance the prestige of the Society both in this country and overseas. Subsequently, Mr. Lantz asked to be relieved of some of his responsibilities, but he remained an active member of the reconstituted Fastness Tests Co-ordinating Committee and of several of its subcommittees.

His work on fastness tests, however, does not exhaust the help which he gave to the Society, for in addition he was a member of the Technical Advisory Committee during the war years, and for some years was the Society's representative on the Textile Divisional Council and the Steering Committee of the British Standards Institution and on the Unification of Testing Methods Committee of the Textile Institute. As a further token of appreciation, the Society awarded him in 1950 a bar to his Silver Medal.

Below his quiet gentle manner there was a unity of purpose to help in all that was best in life; we shall treasure his memory.

P. W. Cunliffe



#### DRAYTON

# **Automatic Dye Vat Control**

#### FOR ALL TYPES OF MACHINES

Drayton dye vat regulators are completely automatic, absolutely dependable and do not call for skilled operators.

Drayton automatic control systems have the highest reputation for reliability in every branch of industry.

These dye vat controls maintain a continuous degree of accuracy in dyeing processes unobtainable by manual control. They reduce working costs and ensure improved and uniform production.

#### TYPE DVI REGULATOR

The simplest regulator available. For control of top temperature only.

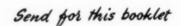
#### TYPE DVIT REGULATOR

This regulator is for top temperature only but includes a timing feature and signalling switches.

#### TYPE DV3 REGULATOR (illustrated)

This regulator is unique in conception. It will maintain a continuous variable rate of temperature rise in terms of degrees per minute; the bottom temperature, the top temperature, the rate of rise and the length of cycle being conveniently adjustable. Signalling feature is incorporated.





# "THE APPLICATION OF AUTOMATIC CONTROL TO THE DYEING PROCESS"

This new publication contains valuable information gained in field experience in collaboration with leading dyers, machine manufacturers, etc. It demonstrates the advantages and the limitations of automatic control, its application, the selection of equipment. The book explains which machines can and which cannot be controlled—and why.

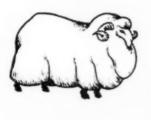
Apply on Business Letterhead to-

DRAYTON REGULATOR & Instrument Co Ltd West Drayton Middlesex West Drayton 2611



Recent additions to our range of

# Wool Dyestuffs







#### METACHROME

Blue RB Brown 6G Brown EB



#### **AFTERCHROME**

Unachrome Brown KE Unachrome Fast Violet R Unachrome Navy Blue 2R







# BROTHERTON

& COMPANY LTD.

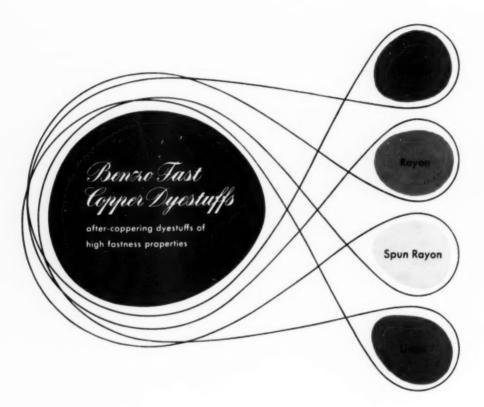
CITY CHAMBERS

LEEDS 1

Telephone: LEEDS 29321 Grams: BROTHERTON LEEDS 1

face xiv

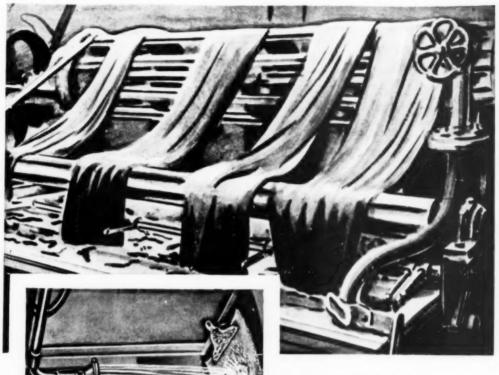
### BAYER offers for PRINTING and DYEING of





FARBENFABRIKEN BAYER LEVERKUSEN





We recommend as water repellent agents -

RESISTOL K (for cotton) RESISTOL W (for wool)

- Great resistance to rain and moisture
- · High permeability to air
- · Fine finish

#### YOU AND WE . . .

YOU keep striving to supply your products in a quality which is more perfect every time. Special auxiliaries play a great part . . .

OUR laboratories are in a position to develop products adapted to YOUR needs . . .

OUR staff of chemists and textile experts will be glad to give you advice . . .

THIS collaboration has proved to give the best results in practice.

#### W. A. SCHOLTEN'S CHEMISCHE FABRIEKEN N.V. - FOXHOL (NETHERLANDS)

For samples and circulars, please contact

Gordon Slater Ltd., Lloyds Bank Buildings, 33 Cross Street, MANCHESTER-2; tel. BLA 0186/7 Henderson, Hogg & Co., 129 Whitefield Road, GLASGOW S.W. 1; tel. GOVan 2061 - 2062 J. L. Bennet & Co., 32 Linen Hall Street, BELFAST; tel. 22318 Technical representative: H. Hutton, 102 Preston Old Road, Cherry Tree, BLACKBURN; tel. Pleasington 6394



# JAMES ROBINSON & COLTPANILINE DYE MANUFACTURERS HUDDERSFIELD ENGLAND

Telephone 314.313

Telegrams ROBINSON HUDDERSFIELD

AGENTS — SCOTLAND — Henderson Hogg & Co. 17 Cadogan Street Glasgow C2. NORTHERN IRELAND AND EIRE — Mr. F. G. Anderson 28 Exchange Street Belfast. SWEDEN — A/B Nils Hollmberg Halmstad I Sweden BELGIUM — Promatex Brussels. AUSTRALIA — The Victorian Chemical Co. Pty. Ltd Melbourne. EGYPT — Societe d'Avancas Commerciales SAE Belfast. DENMARK — The Stayers Co. Copenhagen FRANCE — Seppic Paris. SPAIN — Medecs Barcelons. PORTUGAL — Weber & Co. 82 Galeris de Paris. I Oporto. INDIA, PAKISTAN AND CHINA — D. 8. J. Powise Ltd 84/88 Quesen Victoria Street London EC4. NORWAY — Petter Endresson Detobiols. 332. 306. FINLAND — A. 8. Onerva Oy Tampere

"DYESTUFFS TO RIVAL NATURE"



NARCISSUS (Daffodils, Jonquils, Pheasant's Eye, etc)

Hardy bulbous Perennials. They may be increased by offsets or propagated from seed, though the latter way takes several years before flowering.

## Cibalans

#### A NEW Range of Wool Colours

Simple dyeing process No aftertreatment Very fast to light and washing Suitable for Nylon



ANILINE COMPANY LTD CLAYTON MANCHESTER 11

Telephone East 1341 (10 lines) Telegrams CIBA MANCHESTER and at Bradford London Leicester Glasgow Belfast Sole concessionnaires in the United Kingdom for CIBA LIMITED Basle Switzerland

# Irgalans



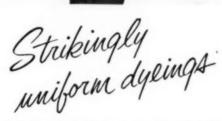
the most outstanding discovery in wool dyestuffs during recent years combine maximum fastness properties with ideal dyeing characteristics

#### GEIGY IN THE LEAD

- 1949 Irgalan Grey BL (Polar Grey BL)
- 1951 Irgalan Brown 2RL, Irgalan Olive BGL, Irgalan Orange RL
- 1952 Irgalan Brown 3BL, Irgalan Brown 2GL, Irgalan Yellow GL
- 1953 Irgalan Yellow 2RL, Irgalan Bordeaux 2BL











#### Are Made with Du Pont Dyes and Technical Service

Of interest to the mill owner, Du Pont offers a complete line of quality dyes with guaranteed uniformity . . . and the finest in textile auxiliaries.

To help you apply these dyes and finishes to greatest advantage, we have prepared complete technical information on dyeing methods and procedures—literature, swatches and samples. And if you request it, Du Pont offers personal help at no cost to you through its local representatives, who are backed by Du Pont's continuous research in the field of dyes and dye application. Our representatives are in a unique position to help you because they can draw on Du Pont's wide

experience both as maker of dyes and creator of textile fibers.

DYER AND FINISHER NEWS. A free subscription to this Du Pont publication is available to you, and will give you up-to-date news about world-wide developments in the field of dyes and auxiliaries. Just clip and mail the coupon below.

For further information, contact Du Pont's local representative, Brown & Forth Ltd., Clifton House, 83-117 Euston Road, London, N.W. 1.

#### DYER AND FINISHER NEWS-FREE!

Du Pont

OU POND

Dyes

BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

	nt de Nemours & Co. (Inc.), Organic Chemical ort Section, Wilmington 98, Delaware, U.S.A.
	irt my free subscription to Dyer and Finishe
Name & P	osition
Company	
Address	

xxii

A second

unaffected by much or

for high my low-temporation

ataly sections

to all types of Auts

SX IV

Per apprillen

roduces reporting (2014

LISSAPO

N

the all-purpose surface-active agent

POR KNITTED WOOLLEN GOODS

Listaber N gives satisfactory results on tubular kniited goods to open washers or garments in bumper subs.

The detailed infermation above sonly to

SHE SHIAL CHEMICAL INDUSTRIES LTO



Janaan far



# Benzanil Supra **Dyestuffs**

FOR MAXIMUM **FASTNESS** TO LIGHT

on cotton and viocope rayon

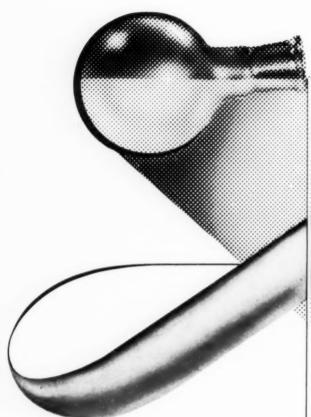
THE YORKSHIRE DYEWARE & CHEMICAL CO LTD LEEDS

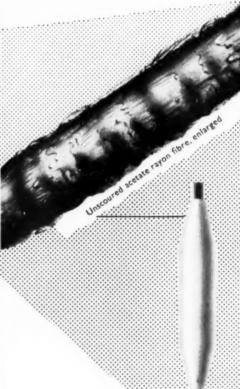


n.d.h./235

# NEKANIL AC

SPECIAL





The ideal detergent for acetate rayon

A most efficient solubilising and levelling agent for dispersed acetate colours BASF

A new auxiliary of

Badische Anilin & Soda Tabrik

For detailed information please apply to ALLIED COLLOIDS (BRADFORD) LTD VALLEY ROAD, BRADFORD, ENGLAND Telephone: Bradford 22361/2

#### **New Books and Publications**

#### Methoden der Organischen Chemie (Houben-Weyl) Band VIII

Sauerstoff-Verbindungen III

Edited by Eugen Müller. 4th edition 1952. Pp. xviii + 775. Stuttgart: Georg Thieme Verlag. Price, DM 98.00.

Every organic chemist knows that Houben-Weul is one of the most, if not the most, important work of reference in preparative organic chemistry. Over twenty years have elapsed since the third German edition appeared, so that the active publication of the fourth German edition, delayed by the second World War and its aftermath, will indeed receive a warm and grateful welcome. Houben-Weyl, to which every organic chemist turns when in search of method or technique, is not merely a compilation of a pick-where-you-like style, but a book of guidance for the most efficient of various alternatives and for the most facile in technique- in short, it is a great time-saver. The present edition continues this useful service, and a guarantee of its efficiency and accuracy is the pleasing fact that the work of revision has been carried out, with few exceptions, by specialists of the Bayer firm at Leverkusen and Elberfeld. This particular volume is the third devoted to a survey of Oxygen Compounds, and includes sections on the Preparation, Transformations, and Reactions of Peroxides (74 pp.), Carbonic Acid Derivatives (172 pp.), Nitriles and isoNitriles including Fulminic Acid (112 pp.), Carboxylic Acids and Decarboxylation (144 pp.), Esters of Carboxylic Acids (144 pp.), and Functional N-Derivatives of the Carboxyl Group (68 pp.). Thoroughness of treatment is obvious on every page, and ease of reference is particularly facilitated by excellent arrangement and printing of material.

H. H. Hodgson

#### Tests for Colour-Blindness

By S. Ishihara. 10th edition 1951. 38 plates + pp. iii + 27. Nippon Isho Shuppan Co. Ltd. London: H. K. Lewis & Co. Ltd. Price, 75s. 0d.

The Ishihara tests for colour blindness were introduced many years before the war, and quickly became established among the simplest and most reliable methods of detecting defective colour vision. The tests are based on confusion charts, i.e. a series of cards containing a background of coloured spots of varied size and hue. Numerals or wavy lines are introduced among these background spots in such a way that persons having defective colour vision read differently from those having normal vision.

The ingenious feature of the Ishihara test lies in the variety of the results obtained. On some plates, colour defectives see exactly the same figures or wavy lines as those with normal vision, whereas in other plates they read an entirely different number. Alternatively, the normal person sees a certain number which the colour defective

cannot see at all; or this position may be reversed, and the normal person fails to see the number or wayy line.

Dichromats thus can be readily distinguished from trichromats and a rough assessment of anomalous trichromats can be made, as in some cases these read the correct numbers but on other plates they see an incorrect one. Some plates (No. 22–27) distinguish between protanopes (red-blind) and deuteranopes (green-blind).

After the entry of Japan into the war, the urgent demand for the Ishihara test cards for testing personnel for the various branches of the Armed Forces led to the 9th edition being reprinted in London with 32 plates. Compared with this edition, the 10th edition, printed in Japan in 1951, has been completely revised, and includes 38 plates and an introduction, explanation, and instructions for use in English, French, and German.

The additional six plates (No. 26, 27, 34, 35, 36, 37) contain no numerals but the testee has to trace winding lines of varying hues. The sequence of the later plates in the 9th edition has also been slightly modified in the new edition. The colouring is also clearer in the 10th edition, which makes the numerals and winding lines stand out more clearly.

Some surprising errors in translation are to be observed in the English section of the explanatory booklet. On p. 2 the word "colour-blindness" is twice used instead of colour-blind; on the same page in two consecutive paragraphs the word "To" is omitted. Peculiarity is misspelt on p. 3, and comparison with the wording of the 9th (English) edition reveals many other deviations from standard English. It is to be hoped that all these errors will be rectified in later editions.

It is difficult to assess a fair price for a unique production of this type, but if the cost seems somewhat high, it has risen by only 20% since 1943 and may be regarded as good value for money. The careful and exhaustive assessment of a large number of tests for colour vision, contained in the Report on Defective Colour Vision in Industry published by the Physical Society in 1946, placed the Ishihara test high on the list of recommended tests.

F. JORDINSON

#### Textile Untersuchungen

By M. Nopitsch. Pp. liv + 322 + 51 plates. Stuttgart: Konradin-Verlag Robert Kohlhammer, 1951. Price, DM 32.50.

There is a dearth of books which adequately deal with the analysis of damaged textiles, and Dr. Nopitsch's work will therefore be welcomed by textile analysts. The author is, however, not justified in saying in his foreword that no work exists which deals collectively with this aspect of textile analysis, because Herzog-Koch's Fehler in Textilien (1938) can hardly be surpassed in this respect. Nevertheless, Dr. Nopitsch has succeeded in treading new ground by adopting a more methodical approach, and his wide experience in

this field has enabled him to give an ordered and coherent account of the methods for the investigation of damaged textiles.

The work falls into three sections-analytical procedure, practical examples, and pictorial After discussing the way to inspect materials by sight, smell, and touch, the author proceeds to describe optical, mechanical, and chemical testing methods. The subject matter is arranged in such a way that the reader is taken step by step through the whole range of analytical procedure as if he were analysing a particular sample. Dr. Nopitsch refers principally to the methods used in his own laboratories, which are also in general use in Germany, although references are frequently found to other work.

The second section deals with practical cases from the author's own experience. The whole range of causes of damage to textile materials is discussed, and this gives the author an opportunity of quoting further testing methods of a more technical nature.

The appendix contains 164 illustrations. They show testing apparatus, photomicrographs of fibres, and illustrations of cases of damage. Although the quality of the photomicrographs is high, the expert will find little that would not have been shown in previous work of this kind.

Three extensive indexes, one for each section, conclude the book.

It is to the author's credit that the reviewer can find little ground for factual criticism. It is not clear, however, why (on p. 66) the sodium zincate test is stated to indicate acid damage only, or why mineral pigments are omitted from the identification tests for dyes (pp. 134 et seq.). Dr. Nopitsch makes practically no use of tabular presentation, and this makes it difficult, for instance, to find one's way through the maze of tests for the identification of fibres, dyes, finishes, etc. An attempt has been made to break the monotony of the text by using italics for the descriptions of testing methods, and by employing many marginal

Taking the book as a whole, it certainly marks a departure from the normal run of textbooks. It is well written and well produced. It would, however, appear that the title is ill-chosen, since the book does not deal with textile investigations as such but with those of damaged textiles. It also seems superfluous to describe the growth and manufacture of fibres in a book of this kind: the student of this specialised section of textile analysis should already be familiar with that branch

of textile knowledge.

The work can be warmly recommended to those interested in this particular field of textile investigations. E. KORNREICH

#### Chemiefasern nach dem Viskoseverfahren (Revon und Zellwolle)

By Kurt Götze. 2nd edition 1951. Pp. xii + 739. Berlin: Springer-Verlag. Price, DM 78.00.

Those who are familiar with the literature of the viscose process over the past twenty-five years will appreciate that the appearance of a comprehensive, reliable, and reasonably up-to-date textbook on the subject is an event of extreme rarity.

The feat of successful authorship in this field. as in so many others which are in a state of active development, becomes progressively more difficult and laborious with the passage of time. Dr. Götze published his first edition - Kunstseide und Zellwolle in 1940, and since that date there have been major technological and theoretical advances. The author has given a very competent account of these new developments, and is particularly to be congratulated on the manner in which he has brought together and discussed the widely dispersed and sometimes highly speculative background theory, which, in common with the rest of high polymer science, has developed from rudimentary beginnings over the past fifteen years.

After a short historical introduction, nearly 200 pages are devoted to cellulose as a raw material. to its chemistry, morphology, and fine structure, to the manufacture of dissolving pulp, and to the testing of its suitability for the preparation of viscose. The sections on viscose manufacture and on spinning discuss, in addition to the classical techniques, recent trends towards continuous manufacturing processes. These are the continuous steeping, pressing, and ageing of alkali cellulose, which were largely pioneered in Germany during the war, and continuous spinning processes. More detailed treatment and a more critical approach could, perhaps, have been given to these developments. In so far as it is possible to present the theory of the viscose spinning process coherently, this has been well done.

Dr. Götze has a specialist knowledge of the manufacture of surface-active materials and of their application to the finishing of textile fibres. He has included a most useful and comprehensive chapter on this subject.

The overall result is a book to which the general reader can turn with interest and confidence and which the specialist will find indispensable. The price is depressingly high. D. ENTWISTLE

#### **Abstracts from British and Foreign Journals and Patents**

The titles of abstracts may be modified. Abbreviations of names of firms are listed in J.S.D.C., 68, 23 (Jan. 1952), and also, together with symbols and the periodicals abstracted, in the annual index

#### I-PLANT; MACHINERY; BUILDINGS

Hydroextraction. M. M. Haruni and J. A. Storrow. Ind. Eng. Chem., 44, 2751–2767 (Nov. 1952); erratum— 45, 690 (March 1953).

Flow rate equations have been developed and checked experimentally, and methods of testing hydroextractors assessed. The relation between hydroextraction and filtration permeabilities is discussed. When more precise research techniques are not available, drainage equations provide a satisfactory and simple analytical procedure for assessing equipment. C. J. W. H.

#### PATENTS

Dissolving Detergents. Clayton Manufacturing Co.

The solid detergent is placed in a basket mounted in the stock tank. The tank is filled with the necessary amount of water, and a jet of mixed steam and hot water is directed through the water and through the basket of detergent until a homogeneous solution of the detergent is produced.

C. O. C.

Continuous Treatment of Artificial Filaments.
H. A. Kuljian.
BP 686,026

A thread-storing and -advancing reel has a wiper body having an inner concave surface corresponding to the curvature of the roll in the reel. On the concave surface there is means for removing excess liquid. C. O. C.

Treating Yarns in Tube Systems with Liquids.

Algemene Kunstzijde Unie.

BP 686,339

The yarn is passed through a separate tube for each of several treating liquids, being separated from each liquid on leaving the tube concerned. Threading of the system may be done automatically by allowing a liquid to carry the yarn from one tube to another. During threading in this way, the liquid at the outlet of each tube is led over a guide to the inlet of the next tube. After threading and before the various treating liquids are introduced, these guides are displaced so that the liquids are given a direction differing from that taken by the "threading" liquid.

C. O. C.

Continuous Wet Processing of Filaments, etc.

Apparatus is described which works at \$\leq 60 \text{ lb./sq. ia.} \]

pressure and in which any individual filament can be easily strung up or fed in without interference with the running of the other filaments.

C. O. C.

Hank-dyeing Machine. E. A. Steinen. BP 686,734
The front of the tank lets down and contains pairs of upper and lower rails, on which are slid the rods for supporting the hanks. This enables the hanks to be fed in through the front, which is then closed, and the dye liquor is circulated.

C. O. C.

Heating the Liquor in Piece-dyeing Machines.

Leemetals.

BP 685,399

The bath is heated without either vibration, noise, or formation of strong directional currents by fitting over the horizontal steam-supply pipe a second horizontal tube of Venturi-shaped cross-section, i.e. it narrows and then widens again, the narrow portion being above the steam pipe. The outlets of the steam pipe are at or near the narrowest portion of the covering tube, a dye-supply pipe or pipes being placed at one or both sides of the steam pipe, preferably at the widest part of that part of the covering tube surrounding the steam pipe.

C. O. C.

Hydroextractor. United States Hoffman Machinery Corpn. BP 687,699

Vibration is prevented in a centrifugal extractor by applying a constant rotating torque to the cage. This torque is just enough to maintain the cage at a critical speed when the fabric in it is in a "weight-unbalanced" condition. This critical speed is that at which the fabric is distributed throughout the cross-section of the cage. This torque is maintained until the fabric becomes

"weight-balanced", whereupon the cage automatically accelerates to "fix" the fabric in its balanced state.

Pouncing Felt Pieces. Frank H. Lee Co.

The piece is formed into an endless belt, and circulated continuously over support guides. An abrasive device pounces the felt, being effective at any one instant over only a small area limited by a comparatively narrow portion of the width of the piece. Gradual and continuous transverse movement of the abrading device means that it follows the general surface contour of the unfinished felt, and so a uniform finish is produced without unnecessary reduction in thickness of the felt. C. O. C.

Reclaiming Detergent Solutions. Barry-Wehmiller
Machinery Co. BP 685,228
Apparatus for reclaiming detergent solutions used under

conditions which produce large volumes of foam.

Electrostatic Coating. Harper J. Ransburg Co.

The arcicles are carried between two electrodes maintained at a high electric potential relative to the articles. The coating material is sprayed perpendicularly to the path of the articles, which thus have some of the coating material sprayed directly on them, while some (rebounding particles escaping from the direct spray) is collected by electrical precipitation on the articles. This combination of the two coating forces results in high coating efficiency.

Automatic Lacquering of Elements
Flexible Strips. E. Armari.

Apparatus for automatically coating zip fasteners, etc. attached to fabric or the like.

C. O. C.

Instruments for Detecting Hardness in Water.
William Boby & Co.

Automatic means for detecting hardness in water, especially suitable for testing water issuing from a base-

exchange water-softening plant.

Calendering, Ironing, etc. Baker Perkins. BP 685,951 A laundry calendering machine is fitted with a clock device which works only when an article is passing a given point in the machine or alternatively when no article is passing that point. Comparison of the clock device at any moment with the reading of a master clock which is in continuous operation indicates the proportion of total running time during which articles have been passing the check point.

C. O. C.

Garment-spotting Board. F. H. Richterkessing.
BP 686,060

The board is made in two parts, one for the main portion of the garment and the other, smaller part for the sleeves. The sleeve board swings parallel to the main board to and from its working position. Swinging the sleeve board works a valve which simultaneously disconnects the suction line of one board and connects the suction line of the other board to the suction device. C. O. C.

Garment Presses. R. G. Whitaker. BP 687,215

Garment Presses. R. Jack. BP 686,467
Presses suitable for garments having yoke sections at the shoulder. C. O. C.

#### II- WATER AND EFFLUENTS

PATENT

Conditioning and Filtering of Water. F. G. Hill. BP 687,675

Plant which gives quick and efficient flocculation and filtration is described. C. O. C.

#### III- CHEMICALS; AUXILIARY PRODUCTS; FINISHING MATERIALS

Stability of Metal Chelates. IV - Ethylenediamine-NN -diacetic Acid and Ethylenediamine-NN diacetic-NN'-dipropionic Acid. S. Chaberek and A. E. Martell. J. Amer. Chem. Soc., 74, 6228-6231

(20 Dec. 1952).

Tables are given showing the acid dissociation constants and chelate stability constants of these two acids for Cu<sup>2+</sup>, Ni<sup>2+</sup>, Co<sup>2+</sup>, Zn<sup>2+</sup>, Pb<sup>2+</sup>, Cd<sup>2+</sup>, and Mg<sup>2+</sup> ions. They are compared with those for the corresponding ethylenediaminetetra-acetate chelates, and the results interpreted in the light of the corresponding structural differences.

Decomposition of Hypochlorous Acid. M. W. Lister. Canadian J. Chem., 30, 879–889 (Nov. 1952).

The rate of decomposition of aqueous hypochlorous acid in presence of excess hypochlorite ions (NaOCl) is almost independent of [OCl-] and proportional to [HOCl]\*. The proposed mechanism is—

$$2\text{HOCl} \rightarrow \text{HCl} + \text{HClO}_2 \text{ (both ionised)}$$
 (i)

$$HOC1 + ClO_{2}^{-} \rightarrow Cl^{-} + HClO_{3}$$
 (ionised) (ii)

$$HOCl + ClO^- \rightarrow Cl^- + HClO_2 \text{ (ionised)}$$

Reaction (i) is slower than (ii), and (iii) is much slower than (i) and (ii). Oxygen is evolved by a first-order reaction and is independent of [ClO-]. mechanism is

$$HOCl + H_zO \rightarrow HCl + H_zO_z$$
 (iv)

$$H_2O_2 + ClO^- \rightarrow Cl^- + O_2 + H_2O$$
 (v)

where (iv) is rate-determining. The activation energy of (i) is  $15.5 \pm 0.5$  kg.cal., and of oxygen evolution 19 kg.cal.

Variations of pH in the Catalytic Decomposition of Hypochlorite. M. H. Booth and G. H. Ayres. 8th Southwest Regional Meeting of the Amer. Chem.

Soc.: Anal. Chem., 24, 2016 (Dec. 1952).

The system has been studied in which NaOCl soln. are catalytically decomposed by compounds and/or complexes of iridium. The pH of this system varies with time between wide limits, depending upon the conditions employed. Type and amount of variation depend upon the initial pH of the system, and this controls also the course of the reaction. When an acid soln, of sodium chloroiridate is added to soln, of NaOCl a colloidal system is formed, whose stability depends upon [NaOCI] as well as upon the initial pH. The catalyst is difficult to reproduce, possibly because of its colloidal nature. observed rapid changes of pH are accompanied by extreme colour transformations, which may be due to variation in colloidal particle size. The particle charge is always negative. The general form of the pH-time curves, and the experimental observations, may be interpreted in terms of a series of oxidation-reduction J. W. D. reactions.

#### PATENTS

Surface-active Agents. Procter & Gamble Co. USP 2,604,481

Compounds of formula R-CO-O-C<sub>n</sub>H<sub>2n</sub>·CO-NXY (R-CO = acyl group of a sat. fatty acid of 8–22 C; n < 6; X = H or Alk of < 5C; Y = Ar, aralkyl, or alkaryl of < 11C) when sulphonated are detergents resistant to hard and salt water and to dilute acids and alkalis.

Cold-swelling Starch Ethers and Esters. W. A. Scholten's Chemische Fabrieken. BP 685,959 Preparation from starch, etc. of ethers, esters, or

mixed ether-esters soluble in cold and/or hot water is described. The products are used as sizes, finishes. etc. C. O. C.

Yarn Sizing. ICI. BP 687,407
A mixture of casein, a peptising agent, an aqueous dis-BP 687,407 persion of a wax, a dispersing agent, and urea is used. C. O. C.

Hardenable Condensates-Textile and Dyeing BP 687,734 Assistants. Basf.

Resinous, hardenable condensates are obtained by heating two molecular proportions of urea with a diprimary alcohol, free from groups (other than OH groups) capable of reacting with urea, until 40-70% of the theoretical yield of the diurethan has been formed, and this is then treated with formaldehyde. The products are soluble in lowmol.wt. aliphatic alcohols, ketones, and esters, and on being baked yield hard elastic films insoluble in water and the usual lacquer solvents. They may be used as textile and dyeing assistants in presence of the usual acid

Organosilylamines-Polymerisation Catalysts for Organosiloxanes and Emulsifying Agents. Dow BP 686,068 Corning.

Compounds of formula  $(R^1_2Si \cdot CH_2)_aNR^2_bH_3_{-a-b}$   $(a = 1 \text{ or } 2; b = 0, 1, \text{ or } 2; a + b > 3; R^1 = \text{Alk}, \text{Alk-O},$  or monocyclic Ar;  $R^2 = \text{Alk}, \, cycloalkyl, \, monocyclic Ar}$ , or hydroxyalkyl in which the OH group is at least  $\beta$  to the N) are useful as catalysts in the setting of organosiloxane resins and as emulsifying agents.

BP 685,048 Coating Compositions. Monsanto. Compositions containing as an essential film-forming material a copolymer of a sec.-alkyl (C4-C12) hydrogen ester of an ethylene-aβ-dicarboxylic acid with a compound of formula R·CH:CH2 (R = subst. or unsubst. phenyl) dissolved in an organic solvent yield on cloth or paper water- and stain-resistant, tough, highly flexible, non-C. O. C. tacky coatings.

Rotproofing Agents. Dunlop Rubber Co. BP 685,614 Multivalent-metal salts of phenylenedicarboxylic acids and nuclear substitution derivatives thereof, one acid radical of each dicarboxylic acid residue being neutralised by the basic radical of a microbicidal quaternary ammonium compound of phenol coefficient (Rideal-Walker test) >100, and the other by the multivalent metal, are good rotproofing agents for both rubber and textiles. C. O. C.

Insect-repellents. U.S. Secretary of the Army. USP 2,605,207-8

Compounds of formula-

$$[CH_{z]_{n}} \cdot C(OH) \cdot \{CH_{z}\}_{m} \cdot COOR \qquad \text{or} \qquad \begin{array}{c} H & CO \cdot R \\ H & C & N \\ HC & C & CH \cdot Q \\ HC & C & CH_{z} \\ & C & C \\ H & H & C \\ \end{array}$$

 $(n = 4 \text{ or } 5; m = 0 \text{ or } 1; R = \text{alicyclic or subst. or unsubst. aliphatic radical of } 2C; Q = H \text{ or } CH_3) \text{ render}$ fabrics repellent to many insects, particularly mosquitos.

Hydroxyphenylsilanes - Bactericides and Fungicides.

Compounds of formula-

$$R^{1}_{a}Si\left( \begin{array}{c} X^{R^{2}_{n}} \\ OH \end{array} \right)_{a=a}$$

(R $^{1}$ = Alk or cycloalkyl; R $^{2}$ = Alk, cycloalkyl, or monocyclic Ar; a=2 or 3; n=0 or 1) are useful as bactericides and

Mordants for Photographic Processes. Kodak. BP 685,475

Mordants for water-soluble acid dyes consist of nondyeforming polymers having periodically occurring substituted amino groups of formula NR<sup>1</sup>R<sup>2</sup> (R<sup>1</sup> and R<sup>2</sup> — same or different Alk or alicyclic groups, or together atoms to complete a sat. heterocyclic ring) or quaternary ammonium salts thereof. They form water-insoluble salts with the dye, so that it can no longer migrate through gelatin or other photographic layers.

Synthetic Detergents (VII p. 132).

#### IV—RAW MATERIALS; INTERMEDIATES; COLOURING MATTERS

Zacharie Roussin. R. Brightman. J.S.D.C., 69, 115-119 (April 1953).

Separation of m- and p-Cresols from their Mixtures. S. A. Savitt and D. F. Othmer, Ind. Eng. Chem., 44, 2428-2431 (Oct. 1952). Freezing-point data for binary mixtures of either m- or

p-cresol with pyridine, 2-aminopyridine, acetamide,

p-toluidine, benzidine, and p-phenylenediamine show that benzidine may be used to separate m- and p-cresols. The m--cresol--benzidine system has a peritectic point at 35 mol. % m--cresol and  $76^\circ\text{-}\text{C}$ , and a transitional max. at 68% m--cresol and  $90^\circ\text{c}$ . The corresponding values for the p--cresol--benzidine system are 29-5 mol. % p--cresol at  $89^\circ\text{c}$ . and 63% at  $137^\circ\text{c}$ . For separation a 60:40 mixture of m--and p--cresol is mixed with benzidine at  $110^\circ\text{c}$ . The p--cresol--benzidine addition compound precipitates, and is filtered off at  $95^\circ\text{c}$ . and washed with benzene. Distillation of ppt. and filtrate at 100 mm, of Hg gives p-cresol (98% pure) and pure m-cresol respectively. A. J.

#### Equilibria of Several Reactions of Aromatic Amines. G. N. Vriens and A. G. Hill. Ind. Eng. Chem., 44, 2732-2735 (Nov. 1952).

From thermodynamic data, equilibrium constants are derived for the formation of N-methyl-, NN-dimethyl-, and N-ethyl-aniline from aniline and methanol or ethanol, and for diphenylamine from aniline, which are in good agreement with experimental results.

A. J.

#### Synthesis of 6-Amino-4-hydroxyisophthalic Acid. H. C. Beyerman and G. L. G. Wielaert. Rec. Trav. chim., 71, 1213-1220 (Nov. 1952).

The preparation was attempted by a number of different routes, the successful one being as follows—

4:6-Dinitro-m-xylene was obtained by nitration of mixed xylenes with fuming nitric acid, which oxidised the ortho and para isomers. The less soluble 4:6-dinitro m-xylene was separated from the other nitration products by crystallising from ethanol.

C. H. R.

## Synthesis of Pyrazolones from α-Keto- and α-Cyanoesters. P. E. Gagnon, J. L. Boivin, and A. Chisholm. Canadian J. Chem., 30, 904-914 (Nov. 1952).

Ethyl a-ethoxalylpropionate reacts with methyl- and phenyl-hydrazine to form the corresponding bydrazones, which on heating give 3-carbethoxy-1:4-dimethyl-5-pyrazolone and 3-carbethoxy-4-methyl-1-phenyl-5-pyrazolone respectively. A Curtius degradation converts the 3-carbethoxy to amino. Similarly, ethyl a-ethoxalyl-butyrate gives 3-amino-4-ethyl-1-phenyl-5-pyrazolone. Ethyl a-eyanopropionate gives 3-amino-2:4-dimethyl-5-pyrazolone directly when heated with methylhydrazine. Ethyl eyanoacetates a-monosubstituted with amyl, hexyl, heptyl, and octyl, and a-disubstituted with butyl, hexyl, and heptyl, react with methylhydrazine sulphate in presence of sodium ethoxide to yield the corresponding 4-mono- and 4:4-di-substituted 3-imino-2-methyl-5-pyrazolones. The ultraviolet absorption spectra are given for neutral and acid soln.

A. J.

#### Steric Effects on Mesomerism. VIII—Benzoquinuclidine. B. M. Wepster. Rec. Trav. chim., 71, 1159-1170 (Nov. 1952).

By studying the ultraviolet spectra of benzoquinuclidine
(I) and its ability to couple with diazonium compounds,

it was shown that the mesomeric interaction between the amine group and the benzene ring is practically zero, the nitrogen having a pyramidal configuration, so that the overlap of the orbitals of its lone electron pair and of the z electrons of the benzene ring is at a minimum.

$$\begin{array}{c} \mathbf{CH} \\ \begin{matrix} \mathbf{CH_2CH_2} \\ \mathbf{CH_2CH_2} \end{matrix} \\ \mathbf{N} \end{array} \tag{1}$$

C. H. R.

#### Azo Dyes from 6-Amino-2:3-dihydro-3-keto-benzo-1:4-thiazine. A. Mackie and A. A. Cutler. Rec. Trav. chim., 71, 1198-1200 (Nov. 1952).

The above compound (I) has been diazotised, and coupled with phenols, naphthols, 3-methyl-1-phenyl-5-pyrazolone, 8-hydroxyquinoline, and anthranilic acid. The products dye wool yellow, orange crimson, and brown of good light fastness.

C. H. R.

## New Pyrolytic Route to certain Keto-anils. E. W. Drew and P. D. Ritchie. Chem. and Ind., 1104 (8 Nov. 1952).

Pyrolysis of x-anilino-x-cyanoalkanes (a-anilinonitriles), which can be obtained by condensing the ketone with aniline and hydrogen cyanide, gives good yields of the corresponding keto-anils; e.g.—

$$\begin{array}{c} C_6H_5\cdot CO\cdot CH_3 \ + \ C_6H_5\cdot NH_2 \ + \ HCN \\ \ \rightarrow \ C_6H_5\cdot NH\cdot C(CH_2)(CN)\cdot C_6H_5 \\ \ \rightarrow \ C_6H_5\cdot N\cdot C(CH_3)\cdot C_6H_5 \end{array}$$

C. H. R.

#### Fluorescent Dyes and the Application of Fluorescence to Textiles. T. T. Baker. J.S.D.C., 69, 109-112 (April 1953)

## Unit Cell Constants of α-Copper Phthalocyanine. M. T. Robinson and G. E. Klein. J. Amer. Chem. Soc., 74, 6294–6295 (20 Dec. 1952).

Tables are given showing the X-ray diffraction pattern and the unit cell constants of a-copper phthalocyanine. C. O. C.

#### Pteridine Syntheses. I—Leucopterin and Xanthopterin. A. Albert and H. C. S. Wood. J. Appl. Chem., 2, 591-592 (Oct. 1952).

2:4:5-Triamino-6-hydroxypyrimidine (I) sulphate with oxalic acid gave an 82% yield of leucopterin (II), which was reduced by sodium amalgam to 7:8-dihydroxanthopterin (III) in 55% yield. Oxidation of this with potassium permanganate gave a 55% yield of xantho-

## Polarographic P. Zuman. Behaviour of Anthocyanins—I. Chem. Listy, 46, 328–333 (1952): Chem. Abs., 47, 52 (10 Jan. 1953).

Observation of the polarographic behaviour of anthocyanins in aqueous and alcoholic solutions at various pH values revealed that any change in colour corresponded to a wave on the curve. Half-wave potentials in a

tartrate buffer at pH 3 with Tl ions as standards were found to be—pelargonidin -0.405, cyanidin -0.40, delphinidin -0.425, pelargonin -0.41, cyanin -0.41, and delphinin (two waves) -0.39 and -0.52 v.

#### PATENTS

Diazo Compounds destroyed by Light of Wavelength 5200 A. or Longer. General Aniline. USP 2,605,182 The diazo derivatives of amines of formula—

(R1 = H or subst. or unsubst. Alk; Rs contains at least 4 conjugated carbon-carbon double bonds in an aromatic or heterocyclic condensed ring system; R2 = atoms to complete a ring; Y = H, acylamino, Alk, Alk O, COOH, or SO<sub>3</sub>H) are efficiently decomposed by light of wavelength 5200-6000 A. or longer.

#### Urethans of Aryl-J Acids. General Aniline.

Urethans of aryl-J acids-

BP 686,823

(Alk of > 7C) are stable and soluble in acids, and with suitable diazo compounds give azo dyes similar to those derived from the aryl-J acids but of better brightness. Thus the anhydrous pyridine salt of N-phenyl-J acid dissolved in dimethylformamide is treated with octadecyl chloroformate in presence of pyridine at 10-15°c, to yield the urethan having Alk = C<sub>18</sub>H<sub>37</sub>.

Benzanthrone. Allied Chemical & Dye Corpn. USP 2,595,348

Benzanthrone is produced in improved yield and purity by carrying out the reaction between anthraquinone and glycerol (or aerolein) at  $122-134^{\circ}c$ . in  $80-91^{\circ}_{\odot}$   $H_{2}80_{+}$  containing, in addition to a finely divided metal, e.g. Pe powder, a mild oxidising agent, e.g. CuSO, nitro-benzene-m-sulphonic acid, nitrosophenol, or an alkalimetal nitrite R. K. F.

Monoazo Disperse Dyes having an N-Difluoroalkyl Radical. Eastman Kodak Co. Disperse dyes of general formula-

$$NO_3 \underbrace{\begin{array}{c} Y \\ \\ X \end{array}} - N : N - \underbrace{\begin{array}{c} Z \\ \\ \\ \end{array}} NR^1R^2$$

(R1 = 3-hydroxypropyl, 2:3-dihydroxypropyl, or preferably 2 -hydroxypropy, 2:3-dinydroxypropy, or preter-ably 2 -hydroxyethyl; R³ = 2 : 2(or 3 : 3) - difluoro-n-propyl, 3:3-difluoro-n-butyl, 4:4-difluoro-n-amyl, or preferably 2:2-difluoroethyl; X = H, Cl, or Br; Y = H, Cl, Br, F, CH<sub>3</sub>·8O<sub>3</sub>, CF<sub>3</sub>, or (where X = H) CH<sub>2</sub>·NH·8O<sub>2</sub> or C<sub>2</sub>H<sub>2</sub>·NH·8O<sub>2</sub>; Z = H, Cl, Br, CH<sub>3</sub>, or C<sub>2</sub>H<sub>2</sub>) give dyeings of good light fastness on acetate rayon. Thus, 2-amino-5-nitrophenyl methyl sulphone is diazotised in nitrosylsulphurie acid in presence of acetic acid and, after being drowned in ice and water, coupled with N-2:2diffuoroethyl-N-2-hydroxyethylaniline. The product dyes cellulose acetate scarlets of good light fastness.

Metal(Chromium)-complex Monoazo Dyes for Wool, BP 687,253

The chromium complexes of monoazo dyes

(A = residue of an ortho-coupling naphthol) are soluble in water, and dye natural and artificial protein fibre violets from weakly acid baths. The diazo components for these monoazo dyes are made by condensation of 4-chloro-3-nitrobenzenesulphonyl chloride with an anilinesulphonamide followed by treatment with NaOH to replace Cl by OH and reduction of the NO<sub>2</sub> to NH<sub>2</sub>; aniline-m-sulphonamide in this way yields 2-amino-phenol-4-sulphon-m-sulphamylanilide. This is diazotised and coupled with alkaline  $\beta$ -naphthol to give the monoazo compound-

Heating with ammonium chromisalicylate gives the metal complex, which gives brown-violet on wool from an acetic acid bath.

#### Metal(Copper)-complex Stilbene Disazo Cotton BP 685,104 Dyes. Gy.

Blue and green direct cotton dyes are made by coupling diazotised 4-amino-4-nitrostilbene-2:2-disulphonic acid (I) with a 2-alkoxy-1-naphthylamine which couples in the 4-position, rediazotising, and coupling with an ortho-coupling naphthol, the disazo dye so formed being con-verted into its copper complex. Thus (I) is diazotised and coupled with 2-methoxy-1-naphthylamine-6-sulphonic acid under weakly acid conditions, and the resulting aminoazo compound is diazotised and coupled with 2-phenylamino-5-naphthol-7-sulphonic acid in presence of soda ash and pyridine to give the disazo dye-

The copper complex is made by heating at  $90-95^{\circ}c$ , with ammoniacal copper sulphate for 16-20~hr; it dyes cellulose dark green.

## Red and Violet Metallisable Disazo Direct Cotton BP 687,328

An aminoazo compound-

(R = radical of the benzene or naphthalene series having a group ortho to the azo link capable of metal-complex formation; X = H or  $SO_3H$ ; one  $Y = CH_3$ , the other  $Y = NH_2$ ) is diazotised, and coupled with an N-acyl derivative of an aminonaphtholsulphonic acid such as J acid, y acid, H acid, etc. to yield a direct cotton dye which may be metallised (especially with copper salts) in substance or on the fibre. Thus the aminoazo compound 2-aminophenol-4-sulphonic acid  $\rightarrow$  2-p-amino-m-methylbenzoylamino-5-naphthol-7-sulphonic acid is diazotised and coupled with 2-cinnamoylamino-5-naphthol-7-sulphonic acid in presence of soda ash. The disazo dye isolated by salting out dyes cotton reds, converted to red-violets fast to light and washing by aftertreatment with copper sulphate.

Brown Disazo Leather Dyes. ICI. BP 687,300 Brown dyes for leather are made by coupling resorcinol with I mol. of a diazotised anilinemonosulphonic acid and I mol. of a diazotised N-o(or p)-aminophenylmorpholine. Thus, by adding to an alkaline solution of resorcinol first 1 mol. of diazotised sulphanilic acid and then 1 mol. of diazotised N-o-aminophenylmorpholine the disazo compound-

is produced, which dyes leather reddish tan browns. E. S.

#### Grey and Black Trisazo Dyes for Leather. ICI. BP 685,078

Trisazo dyes giving greys and blacks on chrome-tanned leather, dyeing principally on the surface, are made by diazotising an aminodisazo compound—

(X = H or Cl) and coupling with m-aminophenol. Thus H acid is first acid-coupled with diazotised p-nitroanline, and then alkali-coupled with diazotised sulphanilic acid. The nitro group of the resulting disazo dye is reduced to NH<sub>2</sub> with Na<sub>8</sub>S, and the product is diazotised and coupled with m-aminophenol in presence of NaOH. The resulting trisazo compound dyes leather greenish black. E. S.

#### 3-Substituted Sulpho-oxindole Dyes. General Aniline. BP 686,962

Dves of formula-

$$SO_3H- \begin{array}{c} R^1\\ N \cdot CO\\ -C:CHR^2 \end{array}$$

(R<sup>1</sup> = H, Alk of < 23C, Ar, or aralkyl; R<sup>2</sup> = a benzenoid aryl, which may be substituted by one or more hydroxy, sulpho, or lower alkyl, alkoxy, or dialkylamino groups, or a heterocyclic radical) are photographic filter and anti-halation dyes which are non-diffusing and readily dischargeable during processing.

C. O. C.

#### Diphenylamine Dyes for Cellulose Acetate Rayon. Celanese Corpn. of America. USP 2,595,359

Yellow dyes suitable for the solvent dyeing of acetate rayon are made by condensing a p-alkyl(or alkoxy)-aniline with 1-chloro-2-nitro-4-phenylsulphonamido-benzene-4'-sulphonic acid by refluxing in aq. sodium acetate. The chloro-2-nitrobenzene with chlorosulphonic acid at 130°c., and adding the resulting sulphonyl chloride to a cold solution of p-aminobenzenesulphonic acid in aq. Na<sub>3</sub>CO<sub>3</sub>. R. K. F.

#### 1-Aminoanthraquinone-2-carboxy-mp-dimethyl

anilide—Pigment. General Aniline.  $\hat{U}SP$  2,589,974
1-Nitroanthraquinone-2-carboxylic acid is heated with SOCl<sub>2</sub> in nitrobenzene, and the resulting acid chloride condensed with 3:4-dimethylaniline. The nitroanilide thus obtained is reduced with sodium hydrosulphite, and the amino leuco derivative finally oxidised by aeration to give a bright red light-fast pigment.

R. K. F.

#### $\alpha$ - 2 : 3 : 5 : 6 - Tetramethylanilinoanthraquinones— Wool Dyes. Allied Chemical & Dye Corpn. USP 2,596,820

Good neutral-dyeing blue wool dyes are obtained by sulphonating anthraquinone derivatives containing one or more a-2:3:5:6-tetramethylanilino groups. These derivatives are obtained e.g. by heating 1:4-diamino-anthraquinone at 180°c, for 15 hr. with monobromodurene in nitrobenzene containing potassium acetate and copper salts, R. K. F.

#### Neutral-dyeing Anthraquinonoid Dyes. FBy. BP 684.84

I-Amino-4-bromoanthraquinone-2-sulphonic acid is condensed with an amide of general formula—

 $\begin{array}{llll} (Z=NH\cdot CO\ \ or\ CO\cdot NH\,;\ X=O\cdot CH_2\ \ or\ SO_2\cdot N(CH_3)_2)\ \ to \\ produce\ \ blue\ \ neutral-dyeing\ \ wool\ \ dyes. & The\ \ condensation\ \ is\ \ carried\ \ out,\ \ e.g.\ \ with\ \ 1-amino\cdot 3-p-methoxy-benzoylaminobenzene,\ \ by\ \ refluxing\ \ in\ \ aq.\ \ ethanol\ \ in\ \ presence\ \ of\ NaHCO_3\ \ and\ \ Cu_2Cl_2. & R.\ K.\ F. \end{array}$ 

#### Methin Dyes for Cellulose Acetate Rayon. General Aniline. BP 684,386

Condensation of a p-dialkylaminobenzaldehyde with cyanoacetic ester to produce a yellow methin dye for acetate rayon is carried out without an inert solvent, but in presence of a small quantity of piperidine. Thus the

$$(C_2H_5)_2N$$
—CH:C(CN)·COOC<sub>2</sub>H<sub>5</sub>

is prepared by adding ethyl cyanoacetate slowly to pdiethylaminobenzaldehyde containing a little piperidine at 80°c. R. K. F.

## Basic Polymethin Dyes. FBy. BP 684,139 N-Alkylcarbazole-3(or 3:6-di)-aldehydes are condensed with 1-methylindolines to give red light-fast basic dyes for e.g. cellulose acetate and other plastics. Thus the dyes—

is prepared by heating N-ethylcarbazole-3-aldehyde and 1:3:3-trimethyl-2-methylene-2:3-dihydroindole in o-dichlorobenzene at 95°c, for 30 min, and treating the product with dil. HCl. R. K. F.

#### β-Copper Phthalocyanine Pigments. Ciba.

β-Copper phthalocyanine is ground in presence of 4-7% of an organic liquid of b.p. < 150%c. and 2-3 times its weight of a grinding substratum, e.g. NaCl or  $Na_2SO_4$ , to yield a dispersible pigment in which the phthalocyanine remains in the β-form.

meroCyanine Dyes. Gevaert. BP 685,390

Dyes of formula—

$$\mathbf{R^{i\cdot N\cdot \{CH:CH\}_{m}\cdot C:[CH\cdot L^{i}]_{m}:A}}$$

$$(A = \begin{bmatrix} C & S \\ OC & C \\ R^z \end{bmatrix} = C - CO \text{ or } C$$

$$\begin{array}{l} = C - - 8 & \cdots \quad D^3 \cdots \\ oc._{N_f} \cdot C \cdot CH \cdot \{L^2 \cdot CH\}_q \cdot C \cdot \{CH \cdot CH\}_c \cdot N \cdot R^3 \} X \\ \vdots \\ R^7 \end{array}$$

 $\mathbf{R}^1$  and/or  $\mathbf{R}^3=p$ -carboxybenzyl;  $m,\ n,\ q,\ r,$  and t=0 or 1;  $\mathbf{L}^1$  and  $\mathbf{L}^2=$  subst. or unsubst. methin;  $\mathbf{D}^1$  and  $\mathbf{D}^2=$  atoms to complete a ring;  $\mathbf{R}^2=$  Alk, Ar, or aralkyl;  $\mathbf{X}=$  an acid radical;  $\mathbf{Z}=$  atoms to complete a heterocyclic ring) are photographic sensitisers which are readily eliminated from the emulsions in alkaline developing baths. C. O. C.

Fluorescent Brightening Agents. Ciba. BP 686,805 Compounds of formula—

 $(X=subst.\ or\ unsubst.\ aromatic\ or\ heterocyclic\ nucleus; Y=NH_s\ or\ the\ residue\ of\ a\ primary\ or\ secondary\ amine\ bound\ by\ the\ N\ atom\ to\ the\ triazine\ ring;\ Z=Cl,\ an\ aromatic\ residue\ linked\ to\ the\ C\ atom\ of\ the\ triazine\ ring\ by\ an\ O\ bridge,\ an\ aliphatic,\ aromatic,\ or\ heterocyclic\ residue\ linked\ to\ the\ C\ by\ an\ S\ bridge,\ or\ Y)\ depending\ on\ their\ components\ are\ substantive\ to\ a\ wide\ range\ of\ substrata.\ They show\ blue\ to\ violet\ fluorescence\ under\ ultraviolet\ radiation.$ 

Caramel. Union Starch & Refining Co. BP 685,961
Colouring matter of extremely high tinctorial power and
much more stable than normal caramel is obtained by
dispersing caramelised carbohydrate in a water-soluble
alcohol in presence of a solubility-regulating liquid of
b.p. 30-80°c., the amount of the latter being sufficient to
prevent formation of a gummy precipitate, and filtering
off the precipitated colouring matter.

C. O. C.

Solid Caramel. B. Selvig. BP 686,509

Sugar is caramelised in presence of water, a binding agent, e.g. farina, being added before all the water has evaporated. The mass is then cooled, and ground in presence of an organic liquid of low b.p., e.g. ether, the amount of this liquid being such that it is completely evaporated during grinding.

C. O. C.

Finely Divided Titanium Dioxide. Saurefabrik Schweizerhall. BP 686,568

Modification of BP 661,685 such that the particle size of the pigment can be controlled. Thermal decomposition is carried out in presence of a little volatile Si compound under such conditions that it is converted into SiO<sub>2</sub>. The rate of flow of this Si compound into the reaction zone is such as to favour maximum production of pigment and to suppress premature formation of TiO<sub>2</sub> and/or crystal aftergrowth.

BP 686,570

A product containing > 90% rutile TiO<sub>2</sub> is obtained by using an Al compound instead of an Si compound, the Al compound being coverted into Al<sub>2</sub>O<sub>3</sub>. The ambient temperature around the auxiliary flame is controlled so as to favour production of rutile TiO<sub>2</sub>. C. O. C.

Ultramarine. IC. BP 686,669

An aluminosilicate, sulphur, and an organic salt of an

An aluminosilicate, sulphur, and an organic salt of an alkali or alkaline-earth metal are heated in absence of oxidising conditions at 750–900°c. for 20 min.—3 hr. and then under oxidising conditions for 30 min.—3 hr. The product is of uniform colour, easily ground into inks, etc., and much less abrasive than the ultramarines hitherto available commercially.

BP 686,670

An inorganic compound of an alkali or alkaline earth metal is used instead of the organic salt. C. O. C.

Zinc Oxide. American Zinc, Lead & Smelting Co.

Zinc oxide of extremely fine particle size and good whiteness is obtained by calcining basic zinc carbonate.

Zinc and/or Cadmium Sulphides and Sulphoselenides. Glidden Co. USP 2,605,167

Improved tinting strength, colour, and texture are obtained by increasing the ratio of hydrosulphide to hydroxide in the aqueous solution of alkali-metal and barium sulphide or sulphoselenide used in preparing the pigments.

C. O. C.

Water-repellent Dyes (X p. 132).

good adhesion to solid substrates.

#### V-PAINTS: ENAMELS: INKS

PATENTS

Cellulose Nitrate Lacquers. ICI. BP 686,671 Solutions of cellulose nitrate and a liquid unpolymerised or partly polymerised ester of a monoethylenically unsaturated alcohol and a monocarboxylic acid containing at least one pair of olefinic carbon-carbon linkages in which the nearer C atoms of each pair are either directly linked to one another, giving a conjugated linkage structure, or are linked through not more than one intermediate C atom, on air-drying yield clear films of

BP 686,672

Solutions of cellulose nitrate and dialkenyl esters of dicarboxylic acids, containing at least one ethylenic linkage in the aliphatic portion of the acid molecule, yield similar films.

Translucent Enamel of Metallic Appearance. DuP. USP 2.604.414

A durable, lustrous, translucent enamel of metallic appearance is obtained by use of the hydrous iron oxide pigments described in USP 2,335,760 and 2,384,579 together with one or two pigments complementary to the iron pigments, so that the yellowness of the latter is neutralised and there results a true grey or a greyish base of the same hue as that desired in the final product. Then a tinting pigment of that hue but of higher chroma is added to bring the product to the desired strength or chroma. Finally the value or lightness is adjusted by adding aluminium flake. Instead of hydrous iron pigments other prime pigment bases may be used.

Dispersing Pigments in Liquids and/or Reducing their Particle Size. DuP. BP 686,234

The pigment is agitated with a film-forming dispersing material and sand of 20-40 U.S. mesh size. This quickly and cheaply disperses the pigment, breaks up any agglomeration of it, and reduces its particle size.

C. O. C.

Imparting Glossy Coatings to Hard Solid Porous
Boards. British Cellophane. BP 686,385
The board is coated with a liquid thermosetting resin,

The board is coated with a liquid thermosetting resin, which is cured while in contact with a smooth, glossy, non-porous flexible sheet of a non-fibrous, organic, resininsoluble material, e.g. regenerated cellulose film, which is subsequently removed.

C. O. C.

Pearl Essence. N.V. "Zilvervisch". BP 686,083

Natural guanine crystals suspended in a water-immiscible liquid are separated into fractions of different size and lustre, the fractions then being worked up separately into pearl essences of different qualities. C.O.C.

Pigment Dispersions (VI p. 131).

#### VI-FIBRES; YARNS; FABRICS

Fibres. C. S. Grove, J. L. Vodonik, and R. S. Casey. Ind. Eng. Chem., 44, 2318–2324 (Oct. 1952).

A review of recent progress in manufacture and uses of synthetic fibres. 179 references. A. J.

Micro-organisms of the Human Skin and their Action on Various Textile Fibres. H. Daehtler. Melliand Textilber. 33, 705-710 (Aug.), 997-1000

(Nov. 1952).

Inoculations made from various parts of the human skin and from human sweat are suitably cultured, and a large number of micro-organisms of the genera Micrococcus, Sarcina, Bacterium, Bacillus, Streptomyces, Saccharomyces, and Debaryomyces are identified. The relative abundance in the various sources of the more commonly occurring species is estimated, the resistance of these to antibiotics is determined, and the effects of mutually antagonistic activity and of pH conditions on the natural equilibrium among the species are discussed. When typical species (Micrococcus epidermidis, Micrococcus pyogenes aureus, Sarcina latea, Proteus vulgare, Bacillus megatherium, Streptomyces griseus, and Debaryomyces Klöckeri) are cultured at 32°C. in presence of wool, cotton, or Perlon, only the wool suffers damage, it being attacked with breakdown into spindle cells by all, except the first two, of the above organisms.

A. E. S.

Electron Microscope Study of the Skin on Cellulose Acetate Fibres. V. Peck and W. Kaye. 10th Annual Meeting of the Electron Microscope Society of America: Anal. Chem., 24, 1867 (Nov. 1952).

The surface layer of cellulose acetate fibres has been studied by the use of high-resolution Al-Be alloy replicas. Chemical etching of the surfaces showed the non-uniformity of the surface layer. Breaking of fibres in tension showed the effects of draft and spinning temp. The skin consists of a highly oriented layer caused by drafting whilst solvent is still within the core of the fibre; it is non-uniform around the circumference of the fibre and is less extensible than the core. In general, higher draft causes formation of a thicker skin, which is made up of layers. Yarns broken in tension show very jagged cracks and hairlike protuberances.

Recovery of Skin Wool. G. Thieme. Melliand Textilber.,

33, 1003–1005 (Nov. 1952).

Existing methods for the recovery of gelatin and hair from the wastes of the fur industry are reviewed. None of them permits simultaneous recovery of both materials, and recovery of hair is accompanied by considerable fibre degradation. A new process is described which permits the simultaneous recovery of gelatin and of wool or hair of good quality from sheepskins and fur wastes. The materials are dipped in an acid bath, drained, and given a vacuum treatment at 40–70°c. A cone. gel of gelatin is formed in the material, and is removed by squeezing, centrifuging, or extraction with hot water.

A. E. S.

Electron Microscope Examination of Wool—The Fraction resistant to Peracetic Acid-Ammonium Hydroxide Treatment. B. Manogue and R. L. Elliott. J.S.D.C., 69, 113-114 (April 1953). Adsorption of Metal Ions by Naturally Pigmented Keratin Fibres. G. Laxer and C. S. Whewell. J.S.D.C., 69, 83-84 (March 1953).

Synthesis of Linear Oligomers of e-Aminocaproic Acid. G. M. van der Want, H. Peters, and P. Inklaar. Rec. Trav. chim., 71, 1221-1227 (Nov. 1952).

Linear tri-, tetra-, and penta-meric compounds have been obtained by the method outlined below—

H·[NH·[CH<sub>2</sub>]<sub>5</sub>·CO]<sub>g+2</sub>·OH

Purification of the di-, tri-, and tetra-mers was carried out by one-dimensional chromatography of an aqueous solution on filter paper. The pentamer, which was only sparingly soluble in water, was purified by a liquid chromatogram.

C. H. R.

#### PATENTS

#### Metal Salts of Cellulose Sulphate—Fibres and Fire-resisting Compositions. Eastman Kodak Co. UNP 2 603 839

Films and fibres which are resistant to both boiling water and fire are obtained by extruding a water-soluble salt of cellulose sulphate into a non-solvent and treating the resulting film or filament with a water-soluble aluminium or zirconyl salt. Aluminium or zirconium salts of cellulose sulphate can also be used as fireproofing agents for cotton, paper, etc.

C. O. C.

## Pigmented Cellulose Acetate suitable for Fibre Formation. BrC. BP 687,481

Pigmented cellulose acetate free from water-soluble salts is produced by forming cellulose acetate and the salt-containing pigment into a compact solid and then subjecting it to aqueous extraction. C. O. C.

#### Washing Tows of Artificial Fibres. Courtaulds. BP 687,740

Continuous wet processing during the production of staple fibre is described.

C. O. C.

Pigment Dispersions. Ciba. BP 686,269
The pigment is dispersed in an aqueous solution of a salt of a carboxylated vinyl ester polymer, and the dispersion treated with an acid and/or salt which forms a water-insoluble salt with the polymer. The resulting precipitate consists of a dispersion of the pigment in the water-insoluble polymer salt, and is suitable for incorporating in plastic masses, e.g. for colouring cellulose acetate spinning solutions or nylon melts, or forming dispersions in organic solvents.

C. O. C.

#### Filaments and Films having Reduced Swelling Properties. Comptoir des Textiles Artificiels.

Filaments, etc. made from a substance containing free hydroxy groups, e.g. regenerated cellulose, polyvinyl alcohol, etc., have their tendency to swell reduced by incorporating in them during their manufacture a waterinsoluble, alkali-soluble, linear polybasic acid-polyhydric alcohol condensate, and then after formation of the filaments treating them with formaldehyde. C. O. C.

## Protein Filaments. Courtaulds. BP 686,117 The wet properties of casein or other protein filaments are improved by treating them, after hardening with an alkali-metal compound in aqueous

solution at pH > 7 and finally treating the resulting alkali-metal proteinate filaments with an epoxy compound, e.g. epichlorohydrin. C. O. C.

## Morpholine Derivatives for Stabilising Viscosity of Polyamides, ICL. Compounds of formula—

$$O(\frac{\mathrm{CH}_{z}\mathrm{-CH}_{z}}{\mathrm{N}\mathrm{\cdot}\mathrm{C}_{R}\mathrm{H}_{zR}\mathrm{\cdot}\mathrm{NH}_{z}}$$

(n=2-12); the N atoms are separated by >1 C), when present during the copolymerisation of a diamine and a dicarboxylic acid, enable the mol. wt. an 1 so the viscosity of the resulting linear polymer to be controlled.

#### C. O. C. Highly Oriented Vinylidene Cyanide Polymers. B. F. Goodrich Co.

When filaments, films, etc. made from vinylidene eyanide polymers are hot-stretched in two or more stages they become highly oriented, with consequent increase in tensile strength, elongation, and flexibility. C. O. C.

## Polythiourea Fibres. Courtaulds. BP 686,190 Treating polythiourea fibres with an epoxy compound, e.g. epichlorohydrin, glycidol, or ethylene oxide, and then washing and drying increases their dimensional stability to heat. C. O. C.

Dissolving Acrylonitrile Polymers. American Cyanamid Co.

The polymer is dispersed in an aqueous soln. containing highly hydrated ions, e.g. a soln. of a thiocyanate. The strength of this soln. is less than that required to dissolve

strength of this soln, is less than that required to dissolve the polymer. The remaining thiocyanate required to dissolve the polymer is then added. This speeds up and simplifies preparation of the polymer solution. C. O. C. Acrylonitrile Interpolymers. Basf. BP 687,537

# Acrylonitrile Interpolymers. Basf. BP 687,537 Polymerising a mixture of acrylonitrile and an N-vinylglyoxaline, which may be substituted in the 2, 4, and/or 5 position of the iminazole nucleus by methyl, ethyl, butyl, or phenyl groups, yields spinnable products which are readily dyed with wool dyes. C. O. C.

#### Heat-stabilisers for Polyacrylonitrile, DuP. BP 686,639 Adding 0·2-4·0% by wt. of the polymer of a mixture of equal parts of (1) sulphuric acid, an organic sulphonic acid, or a hydrated salt of an organic sulphonic acid and

acid, or a hydrated salt of an organic sulphonic acid and (2) a substance containing an SH group gives stability to heat.

C. O. C.

Acrylonitrile Spinning Solutions. Union Carbide & Carbon Corpn.

USP 2.603.620

#### & Carbon Corpn. USP 2,603,620 Acetonitrile is an excellent solvent for acrylonitrilevinyl chloride copolymers at $\ll$ 60°c. C. O. C.

#### Imparting Dyeing Properties to Polyacrylonitrile-Vinyl Acetate Copolymers. Monsanto. USP 2,603,621

Non-dyeable fibre-forming acrylonitrile-vinyl acetate copolymers are given affinity for acid dyes by incorporation of 2-15% of N-vinylglyoxaline in the mix before polymerisation.

C. O. C.

#### 

Copolymers of acrylonitrile and allyl esters of halogensubstituted aliphatic monocarboxylic acids of < 9 C are given affinity for acid dyes by treating them with amines or ammonia. C. O. C.

#### Acrylonitrile Copolymers. Industrial Rayon Corpn. BP 686.023

Tripolymers of acrylonitrile (78–82%), vinylidene chloride (3–7), and vinyl chloride (15) have particularly advantageous molecular orientation and solubility properties as well as good heat stability, relaxation resistance, and heat resistance.

C. O. C.

#### 

Retention of Organic Liquids by Jute (XIV p. 135).

Measurement of Fibre Swelling by the Liquid Permeability
Method (XIV p. 135).

#### VII DESIZING: SCOURING; CARBONISING; BLEACHING

Synthetic Detergents. H. Stupel, Melliand Textilber., 33, 1025–1028 (Nov.), 1101–1105 (Dec. 1952).

Data in the literature on the detergency and soilsuspending properties of solutions of soap and various synthetic detergents are reviewed and correlated. The properties of these detergents, singly and in combination, dissolved in water of various degrees of hardness, and in presence of various substances, e.g. polyphosphates, fatty alcohols, and carboxymethyl cellulose, are discussed and presented in the form of tables and graphs. Other subjects discussed are—the production of synthetic detergents in tablet form; the effects of detergents on the skin and the use of protective additives; the relation between the chemical constitution of detergents and their properties; analytical methods; economic and supply difficulties in manufacture; and outstanding problems, e.g. the production of satisfactory synthetic washing powders, particularly from non-ionic detergents. There are 175 references. A. E. S.

PATENTS

Recovery of Solvents in Dry Cleaning. and H. Holz. BP 685,889

Where the solvent vapour removed during drying is condensed by water being sprayed into the vapour-laden atmosphere, the solvent contained in the water is recovered by subjecting the mixture to violent movement, e.g. by means of a circulating pump, so as to cause the solvent to deposit in the water.

C. O. C. to deposit in the water.

Bleaching Yellow Maize. ICI. BP 686,241 The grains are treated at ordinary air temperature with an acidified soln, of an alkali or alkaline-earth metal chlorite. There is very little loss of maize. C. O. C.

Bleaching Wood. R. Orth. BP 685,786 Loosening the micellar structure by treating with aqueous NaOH or KOH before peroxide bleaching speeds up bleaching and renders possible bleaching of the blue and blue-black discoloration of firwood or other mouldaffected wood.

#### VIII— DYEING

Influence of Particle Size on the Dyeing Properties of Vat Dyes. T. Flanagan. J.S.D.C., 69, 18-23 (Jan.); C. M. Whittaker and T. Flanagan, ibid., 119-120 (April 1953).

Dyeing and Finishing of Warp-knitted Fabrics made from Regenerated and Synthetic Fibres. J. Bromley and A. G. Cheek. J.S.D.C., 69, 50-58 (Feb. 1953).

Dyeing a Blend of Wool and Fibrolane for the Hand Knitting Trade. R. C. Cheetham. J.S.D.C., 69, 76-83 (March 1953).

Azoic Stripping with Surface-active Agents. J. L. Moilliet. Chem. and Ind., 1198 (6 Dec. 1952).

Insoluble azoic pigment is very soluble in cationic micelles of cetyltrimethylammonium bromide in alkaline medium, the mechanism probably involving salt links between  $-N(\mathrm{CH_3})_a^+$  and phenolic OH at the surface and also some bulk solubilisation in the interior of the micelle. C. J. W. H.

PATENTS

Dycing Human Hair. Lever Brothers & Unilever. BP 687,227

Human hair may be dyed, fast to washing, perspiration,

and light, with aqueous suspensions of pH < 8 of non-oxidisable organic dyes which are soluble in acctone or ethyl acetate. The temperature should be approx. 40-55°C., the higher the temperature the deeper being the dyeing.

Fluorescent Dyes and the Application of Fluorescence to Textiles (IV p. 127).

Pigmented Cellulose Acetate suitable for Fibre Formation

(VI p. 131).

Pigment Dispersions (VI p. 131).

#### IX-PRINTING

Printing with Onium Dyes. ICI. BP 686,036Faster prints are obtained with dyes containing one or more isothiouronium salt groups, each directly attached to a methylene linkage itself directly attached to a C atom of an aromatic nucleus, which is an integral part of the dye molecule after fixation, if they are applied in presence of an organic acid and a hydrophilic organic substance and then, after steaming, treated with a precipitating agent for the dye, e.g. an alkali, a thiocyanate, an aromatic sulphonic acid or sulphonate, etc.

Producing a Set of Colours for Ombré Printing. R. Smejda. BP 687,693

The colours and the binder are introduced unmixed into a corresponding number of compartments of a rectangular box. These compartments are separated by at least one partition wall which runs generally the length of the box and is shaped according to the colour share or quota of each cross-section. The contents of the box are then subdivided in sections by parallel separating walls running across the box. Finally, the colour contained in each section is separately mixed and fed to the printing machine. This avoids vague shading and blending of the colours along their boundary lines, because the transitions can be predetermined with mathematical precision so as can be predetermined with maintained width or any part to extend over the entire printing width or any part C. O. C.

Bleaching Accelerators in Colour Photography.

General Aniline.

BP 687,768

Pyrrolinophenazines and indophenazines are not substantive to gelatin, and though they are coloured do not Used as bleaching accelerators in colour photography they do not affect the quality of the final dve image.

Pigment Dispersions (VI p. 131).

#### X-SIZING AND FINISHING

Survey of the Quality of Crease-resist Treatment on Fabrics supplied to the Retail Trade. H. W. Best-Gordon. J.S.D.C., 69, 41-50 (Feb. 1953).

Water-repellent Dyes. C. C. DeWitt and P. D. Shroff. Ind. Eng. Chem., 44, 15 A-17 A (Nov. 1952).

Dyes containing long-chain alkyl groups impart water repellency as well as colour to textiles. Octylrosaniline made cotton fabrics extremely resistant to wetting, and several azo dyes were repellent in direct proportion to chain length. The long-chain dyes had 2-3 times the waterrepellency of the unsubstituted dyes, and 12-60 times that of the undyed fabric. C. J. W. H.

PATENTS

Water-repellent Finish. Arkansas Co. USP 2,603,576 A water-repellent finish resistant to washing and drycleaning is obtained by treating first with a wax emulsion and then with a compound of a ter- or quadri-valent metal and an acid. A permanent film-forming agent, e.g. a resin, cellulose derivative, or a protein, is present in one or both baths. C. O. C.

Flameproofing. Monsanto. USP 2,603,614

The flameproof finish yielded by use of a phenolic resin and the complex addition product of melamine and phosphorus pentoxide has a negligible afterglow period. C. O. C.

Two-way-stretch Fabrics. United States Rubber Co. BP 685,412

Fabric containing heat-shrinkable weft yarns is heatshrunk, coated on one side with tacky rubber, and then bonded to a longitudinally stretched rubber belt. This belt is then allowed to contract to shrink the fabric warpwise, after which the fabric is heated to dry the tacky coating, and finally removed from the belt. C. O. C.

Coating Webs with Flocks, BrC. BP 686,101 When flocks are applied to an adhesive surface, very great reduction in the tendency to self-adhesion of the flocks is obtained by coating the fibres with a finely divided, solid, non-thermoplastic, water-insoluble, inert, neutral inorganic substance, preferably by application from an aqueous dispersion in which <90% of the coating agent is of particle size 1-50 µ, and in absence of a dispersing agent. C. O. C.

Dyeing and Finishing of Warp-knitted Fabrics made from Regenerated and Synthetic Fibres (VIII this page).

#### XI—PAPER AND OTHER CELLULOSIC PRODUCTS

Cellophane. G. C. Inskeep and P. van Horn. Ind. Eng. Chem., 44, 2511–2524 (Nov. 1952).
An account of the manufacture of regenerated cellulose

film. C. J. W. H.

Fractionation of Cellulose Acetate. A. J. Rosenthal and B. B. White. Ind. Eng. Chem., 44, 2693–2696 (Nov. 1952).

Fractionation of cellulose acetate from acetone soln. by precipitation with water, followed by cross-fractionation of a soln, of one water fraction with n-pentane, yields cellulose acetate fractions which are individually homogeneous with respect to acetyl value (A.V.) and intrinsic viscosity (I.V.). By this technique six individually homogeneous fractions were obtained in two series, one of constant I.V. and the other of constant A.V. Solutions (0.02%) of these fractions in either acetone, acetic acid, or ethyl lactate were titrated to turbidity with water, ethanol-water (2:1), ethanol, n-propanolwater (1:1), n-propanol, methanol, ethyl acetate, butyl acetate, isopropyl ether, n-pentane, or carbon tetrachloride. In general, solubility increases as A.V. increases and I.V. decreases.  $\Delta(\text{A.V.})$  is defined as the difference in acetone conen. at saturation for any one solvent-precipitant system for a range of fractions of constant I.V., and A(I.V.) the difference in acctone concn. for a range of fractions of constant A.V. A solvent-precipitant system of high  $\Delta(I.V.)/\Delta(A.V.)$  ratio is sensitive to I.V. distribution, and a system of low A(I.V.)/A(A.V.) ratio to acetyl value distribution. Examples are acetone-ethanol for high ratio (5.5) and acetone-ethanol-water (2:1) for low ratio (0.41).

Light Absorption of Cellulose Derivatives. II—Ultraviolet Absorption Spectra of Cellulose Acetate and Nitrate. E. Treiber and W. Lang. Melliand Textilber., 33, 1021-1024 (Nov. 1952).

Solutions in various solvents of a number of cellulose derivatives, including various cellulose acetate and nitrate preparations, are examined for their absorption in the ultraviolet region. They show true absorption only in the region in which analogous low-mol.wt. substances, e.g. simple acetic and nitric esters, absorb, though the fall in absorption at the upper limit, e.g. 250 m $\mu$ . and 330 m $\mu$ . respectively, is more gradual and extends for about 40 m $\mu$ . beyond this limit. At longer wavelengths there is apparent absorption attributable to the Tyndall effect. Cellulose tristrichloroacetate and benzyl cellulose behave similarly. A. E. S.

Action of Hydroxylamine and its Derivatives on Cellulose Trinitrate in Pyridine. G. H. Segall and C. B. Purves. Canadian J. Chem., 30, 860–871 (Nov. 1952).

Cellulose trinitrate is degraded by pyridine to an amorphous powder with the loss of ca. one-third of the nitrate groups (Angeli, J. C. S., 116, 196 (1929)). Inclusion of excess hydroxylamine, to protect carbonyl groups, causes evolution of I mol. of N<sub>2</sub> per glucose residue and a high yield of a fibrous cellulose containing ca. 1-7 nitrate and 0-08 oxime groups per glucose residue. Replacement of hydroxylamine by O-methylhydroxylamine suppresses the evolution of N<sub>2</sub> and gives a small substitution of methyloxime groups. Hydroxylamine hydrochloride causes evolution of N<sub>2</sub>O (85%) and N<sub>2</sub> (15%) and formation of a fibrous product containing ca. 1-7 nitrate and 1-0 oxime groups per glucose residue. With O-methylhydroxylamine hydrochloride, no gas is evolved, and the product contains 1-0 substituted methyloxime group per glucose unit. Degradation probably occurs in the 2- or 3-positions. All four fibrous products are stable to pyridine and NaOH, and are soluble in a wide range of solvents.

Paper from Artificial Fibres. American Viscose Corpn. BP 687,041 Production of paper from regenerated cellulose fibres is described. C. O. C.

Mineral-coated Paper. Consolidated Water Power & Paper Co.

A printable paper-coating composition suitable for application by a machine transfer process comprises

mineral pigment and a modified starch in aqueous dispersion, having a solids content of 45–60%, and a modified starch content of 100–150 parts per 970 parts of bone-dry pigment. The starch may be enzyme- or barium peroxidemodified, and the coating may include a defloculating agent, e.g. a sodium phosphate, and a water-soluble soap, e.g. ammonium stearate. The composition is preformed into a viscous adherent film of relatively low moisture content on a rotating surface, whence it is transferred to the surface of a continuously moving flexible web, e.g. a condensed paper web travelling at 700–1000 ft./min., and immediately heat-dried. The coated sheet, suitable for printing, has a smooth, porous, flexible, soft, and absorbent coating of uniform texture compacted and bonded with the surface of the paper.

The composition comprises mineral pigment and an enzyme-modified starch in aqueous dispersion having a solids content of 50–62° a., and 60–300 parts of starch and 1–6 parts of a deflocculating agent, e.g. tetrasodium pyrophosphate, per 970 parts of bone-dry pigment, and 2–10 parts of ammonium stearate per 100 parts of starch. The thixotropic composition is transferred as a preformed film from a rotating surface to the surface of a paper web running at 800–1000 ft./min., and after being dried yields a thin, dense, substantially uniform, flat, compact, and highly printable coating bonded to the surface of the paper. The composition has an apparent yield point of 500–5200 dynes/sq.cm. and a mobility of 0-0575–0-750 rhe.

Drying Films of Regenerated Cellulose. La Cellophane.

BP 687,726
Several films of regenerated cellulose may be dried in contact with each other provided they are temporarily separated one or more times during their passage through the drying machine.

C. O. C.

Measurement of Fibre Swelling by the Liquid Permeability Method (XIV p. 135).

#### XII—LEATHER; FURS; OTHER PROTEIN MATERIALS

Recovery of Skin Wool (VI p. 130).

#### XIII-RUBBER; RESINS; PLASTICS

PATENTS

Plasticiser for Polyvinyl Chloride. Monsanto, USP 2,603,619

Compounds of formula-

ROOC-CH2-OX-XO-CH2-COOR

 $(R=Alk\ of\ <11\ C)$  are compatible with polyvinyl chloride over a wide range of proportions and effectively plasticise it over a wide range of temperatures. C. O. C.

Stabilisers for Vinyl Halide Resins. Titan Co. BP 687,425 A basic lead phthalate (0·25-15·0% by wt.) stabilises vinyl halide resins to light and heat. C. O. C.

Lacquers for Transfers for Styrene Surfaces.
Plastic & Diceast Products Corpn. USP 2,603,618
Use of a styrene plastic lacquer in printing the transfer renders the transfer readily applicable to a styrene surface by an incipient fusion process.

C. O. C.

Artificial Leather. Firestone Tire & Rubber Co. USP 2,605,247 A method of making artificial leather from blends of vinyl chloride resins and butadiene-acrylonitrile copolymers with formation of smooth surfaces, which do not

mers with formation of smooth surfaces, which do not craze when stretched, and which have satisfactory tear resistance and tensile strength.

C. O. C.

Hardenable Condensates—Textile and Dyeing Assistants (III p. 126). Highly Oriented Vinylidene Cyanide Polymers (VI p. 131). Heat-stabilisers for Polyacrylonitrile (VI p. 131).

#### XIV-ANALYSIS; TESTING; APPARATUS

N.P.L. Colour Temperature Scale. [National Physical Laboratory,] Nature, 170, 783-784 (8 Nov. 1952).

Laboratory.] Nature, 170, 783-784 (8 Nov. 1952).
In July 1952 the Director of the National Physical Laboratory announced that in future the 1948 International Temperature Scale would be used (instead of the 1927 scale) in assigning colour temperatures to light sources calibrated at the Laboratory. Corresponding values and conversion factors for the two scales of importance for the calibration of tungsten-filament lamps are quoted.

C. J. W. H.

Indicators for use in Organic Liquids. U.S. National Bureau of Standards. Technical News Bulletin, 36, 168-171 (Nov. 1952).

One of the most suitable indicators for investigating the acidity or alkalinity of organic solvents is bromophthalein magenta E (tetrabromophenolphthalein ethyl ether).

C. J. W. H.

Titrimetric Determination of Alkali-metal Carbonates and Bicarbonates in Presence of One Another. D. Koszegi and E. Salgó. Z. anal. Chem., 137, 22-26 (1952): Chem. Abs., 47, 71 (10 Jan. 1953). The alkali-metal carbonate is determined by titration

The alkali-metal carbonate is determined by titration with aq. BaCl<sub>2</sub> in presence of phenolphthalein. When all the CO<sub>2</sub><sup>2-</sup> has reacted the solution becomes colourless. The unchanged bicarbonate can be calculated by determining the total alkali, or excess acid can be added to the solution already titrated with BaCl<sub>2</sub> and the excess titrated with carbonate-free NaOH.

C. O. C.

Analytical Methods for Industrial Wastes. II—Determination of Pyridine and Pyridine-base Compounds in River Water and Industrial Wastes, R. C. Kroner, M. B. Ettinger, and W. A. Moore. III—Study of Chromium Toxicity by Several Oxygen Demand Tests. R. S. Ingols and E. S. Kirkpatriek. V—Determination of B.O.D.\* of Sewage and Industrial Wastes with the Polarograph. A. W. Busch and C. N. Sawyer. VII—Determination of Copper Ion by Modified Sodium Diethyldithiocarbamate Procedure. C. A. Noll and L. D. Betz. Anal. Chem., 24, 1877–1881, 1881–1884, 1887–1891, 1894–1895 (Dec. 1952).

II—A preliminary distillation removes turbidity and possible interfering compounds, and concentrates the sample if necessary. After dilution to suitable conen, the sample is buffered with CH<sub>2</sub>·COONa (and adjusted to pH 6-8-8-0 if necessary), and benzidine hydrochloride and BrCN are added; the reaction, which occurs in a layer of butanol, requires ~ 90 min. for completion. Factors which affect the reaction, such as time, temp., conen. of reagent, and pH, are discussed. The reaction is sensitive to 0-005 p.p.m. of pyridine, and can be used within the range 0-005-1-0 p.p.m. The resulting colour is measured spectrophotometrically at 520 mμ. Other pyridine derivatives which also react quant, under the same conditions are not of concern to the textile chemist.

III—The toxic level of Cr is controlled by several variable factors, including the presence or absence of oxygen, valency of the Cr, type of organism (auto- or heterotrophic), and the rate of metabolism. A possible mechanism for the toxicity of the chromate ion under anaerobic conditions is discussed, and is considered to be simply one of inert, small-particle interference.

V—A single-potential technique, eliminating residualcurrent measurements and using only one calibration curve for a series of substrates, may be applied to industrial wastes. Accuracy is somewhat greater than with the Winkler method, and analysis is more rapid (~ 1.5 min. per sample). Industrial wastes examined in the course of the investigation included kier liquor, waste sulphite liquor, and formaldehyde, furfuraldehyde, rag-rope, and tannery wastes. Full details are given.

VII—By reducing the concn. of sodium diethyldithiocarbamate to 1% of that normally used, and diluting the NH<sub>4</sub>OH reagent, interference of Zn, Fe, Pb, and a number of other substances is eliminated, and solvent extraction is not necessary. The colour developed is measured spectrophotometrically at 448 mµ, and Beer's law is obeyed up to Cu concn. of 10 p.p.m. Tolerable limits of concn. of normally interfering ions are given. The procedure is fully described. Estimation of Small Amounts of Copper. E. M. Skibina. J. Anal. Chem. U.S.S.R., 7, 244-251 (July-Aug. 1952).

To the neutral or weakly acid soln. under test ( $\sim 4$  ml.) add phenylsemicarbazide (0.6 ml. of a 0.1% soln.), heat to 91–92°c, on the water-bath, cool, and add a few drops of 10% aq. NH<sub>3</sub>, when a golden-yellow colour develops in presence of Cu; 0.01  $\mu$ g. may be detected. The reaction is fairly specific.

A. E. S.

Colorimetric Estimation of Iron. M. Ya. Shapiro. J. Anal. Chem. U.S.S.R., 7, 214–218 (July–Aug. 1952). Protocatechualdehyde (0·1 ml. of a  $0\cdot25\%$  soln. to 1 ml. of soln. under test) may be used as a reagent for Fe³+, the reaction being carried out preferably in weakly ammoniacal soln., when a red coioration, conforming to the Lambert–Beer law, is produced. The colour due to the reagent alone is yellow. The reaction will detect 0·2 p.p.m. of Fe and is highly specific—Fe²+ does not react, and  $MnO_4^2$ -,  $VO_9^{-}$ , and  $Ce^{3+}$  give colours that are distinct from that given by Fe³+. A. E. S.

Use of Ethylenediaminetetra-acetic Acid in Polarography. C. H. Hale and M. N. Hale. 8th Southwest Regional Meeting of the American Chemical Society: Anal. Chem., 24, 2015 (Dec. 1952). Discussion of the application of the complexing action of this acid with many metal ions to prevent them from interfering in polarography. C. J. W. H.

Spectrophotometric Method for the Determination of Hydrazine, G. W. Watt and J. D. Chrisp. Anal. Chem., 24, 2006–2008 (Dec. 1952).

Determination is based upon the yellow colour produced when a soln, of p-dimethylaminobenzaldehyde in ethanol and HCl is added to a soln, of hydrazine in dil. HCl, this being measured spectrophotometrically at its transmittancy min. of 458 m $\mu$ . Beer's law is obeyed for conen. of hydrazine up to 0·77 p.p.m., with an optimum range of 0·06–0·47 p.p.m. within which the relative error  $\gg 1\%$ . J. W. D.

Determination of the Carboxyl Content of Oxidised Starches. M. F. Mattisson and K. A. Legendre. Anal. Chem., 24, 1942-1944 (Dec. 1952).

The starch is leached with HCl to remove existing cations, and exhaustively washed to remove the HCl; then the liberated COOH groups are titrated directly, hot, with NaOH to the phenolphthalein end-point. Acidity of the original starch is attributed to "impurities" such as fatty acids; subtraction of this quantity from the acidity of the demineralised starch obviates the need to remove fatty acids by solvent extraction before determining the acidity. Except in the case of very highly oxidised starches, this correction gives a better approximation to the carboxyl content than when it is omitted. As compared with the method in which the demineralised starch is treated with calcium acetate soln., releasing CH<sub>3</sub>·COOH which is titrated, the paste titration method is more simple and rapid, requires less skill in operation, and is of better precision, since the buffering action of the pasted starch system is superior to that of the calcium acetate-acetic acid system; it is thus recommended for routine control.

Physicochemical Analysis of Diazo Compounds.
R. A. Paris and J. Vial. Chim. anal., 34, 223–225 (1952): Chem. Abs., 47, 72 (10 Jan. 1953).

Diazo compounds can be analysed by means of standard solutions of phenoxides by following the coupling reaction either thermometrically or conductometrically. In trials using the diazo derivatives of sulphanilic acid, p-nitroaniline, and benzidine, the results obtained were within about 1% of the truth.

Quantitative Analysis of Azo and other Dyes and Intermediates. F. M. Arshid, N. F. Desai, C. H. Giles, and G. K. McLintock. J.S.D.C., 69, 11-18 (Jan. 1953).

Determination of Copper in Monastral Blue. N. P. Kanyaev and A. A. Spryskov. J. Appl. Chem. U.S.S.R., 25, 1220-1221 (Nov. 1952).

The copper content of a copper phthalocyanine preparation is determined gravimetrically as CuO. The material is decomposed by cautious treatment in a crucible with nitric acid, first with acid of sp.gr. 1·465 and later with

<sup>·</sup> Biological oxygen demand

acid of sp.gr. 1.5. Acid and phthalic anhydride are driven off by heat, and the residue is calcined at red heat. A. E. S.

X-Ray Diffraction Analysis of Fibrous Materials. A. Weidinger. Symposium on "The Physics of Fibrous Materials" (Arnhem: Dutch Physical Society, 1950), pp. 37-46.

The influences of crystal structure, molecular shape, and swelling on the X-ray diagram are briefly discussed, together with the X-ray determination of crystallite orientation and degree of crystallinity in cellulose fibres. W. R. M.

tion and degree of crystallinity in cellulose fibres, W.R.M.

New Embedding Method for the Preparation of

Thin Sections. H. Bedarff. Melliand Textilber.,

33, 1044-1045 (Nov. 1952).

33, 1044-1045 (Nov. 1952).
Suitably mounted fibres are immersed in a thermosetting resin preparation, viz. Moulding Resin VP 1563 with an addition of 2% of Hardener VP 1562 (Dynamit A.G., Troisdorf), which is then set by being heated at 65°c. for 2-3 hr.; sectioning, etc. is carried out in the usual way. It is claimed that the medium is more satisfactory for the preparation of thin sections than the usual wayes.

A. E. S.

usual waxes. A. E. S.
Retention of Organic Liquids by Jute. W. A. Bell.
J. Textile Inst., 43, T 595-T 597 (Dec. 1952).

It is suggested that retention of organic liquids by jute, e.g. in solvent extraction of batching oil prior to regain determination, may lead to considerable error. Experiments are described in which conditioned raw jute is Soxhletextracted with different solvents, exposed in a fume chamber till no smell remains, and dried for different times at 110 °c. Appreciable differences are found between the regains of unextracted controls and of solventextracted samples. CCl4 gives retentions ca. 2.5%, ethyl ether slightly lower; petroleum ether (b.p. 40-60 c.), of which a negligible quantity is retained, appears to be the most suitable solvent. The initial presence of moisture is necessary for solvent penetration and retention, no increase in weight being found if jute is extracted immediately after oven-drying, and all retained solvent being release if the fibre is subsequently soaked in water. No comparable solvent retention is shown by cotton, which may be due to the fibre structure having a lower amorphous component. J. W. B.

New Microscopical Technique for the Study of Viscose Rayon Fibres. N. Iwanow and J. Meybeek. Bull. Inst. Text. France, (35), 51-73 (Oct. 1952).

Experimental details are given. Fibres of lengths  $20\text{--}60~\mu$ , are cut and dyed, and the sections examined in two directions at right angles. The authors indicate how their technique can be applied in problems connected with the quality control of rayon staple production, the investigation of stripiness on dyed fabrics, and kinetic diffusion studies of dyes across fibre sections. G. L.

Measurement of Fibre Swelling by the Liquid
Permeability Method. M. Carroll and S. G. Mason.
Canadian J. Technol., 30, 321–333 (Dec. 1952).
The volume swelling of nylon, acetate and viscose rayons, and sulphite pulp (both dried and undried) is calc.

by measuring the liquid permeability coefficient of carefully formed fibre pads and applying the Kozeny-Carman equation. Measurements on the first three fibres carried out in a non-swelling liquid (kerosene) agree well with specific volume values obtained by displacement in the same liquid. Measurements on these fibres swollen in water give only fair agreement with those calc. from moisture regain and from centrifuging measurements, but are deemed nevertheless to be correct values, since the vapour sorption and centrifugal retention methods have The volumes of mixtures of a water-swollen limitations. cotton and a sulphite pulp are additive. With waterswollen pulps, the difference between the permeability and centrifuging values is partly accounted for by the deswelling of the fibre by compressive stresses. The swelling of pulp fibres in different liquids, the effect of fibre length, and the relationship between swelling and paper strength are briefly discussed in illustration of the wide potential value of the method in the study of swelling phenomena. The experimental procedure is fully described and there is a diagram of the permeability cell. J. W. D.

Spectrophotometric Method for Following Dichromate Oxidations. M. J. Cardone and J. Compton. Anal. Chem., 24, 1603-1908 (Dec. 1952).
 Dichromate conen. is measured by means of the absorption band at 349 mµ.; this is free from Cr<sup>3+</sup> interference,

and it does not shift when  $\rm H_2SO_4$  conen. is < 8 M. Intensity of the absorption band is lowered by  $\rm H_2SO_4$  but this is minimised by addition of  $\rm H_2PO_4$ . Dichromate may be determined with an accuracy of  $\pm$  0-3% in the range 0-12-0-30 m-equiv./100 ml. with precision equal to that of the classical iodometric method. The method has been successfully applied to the oxidation of several classes of organic compounds, including glycerol, glycols, and simple aliphatic aldehydes and fatty acids. The recommended procedure is described fully. J. W. D.

Spectrophotometric Study of Dichromate-Chromic Salt Mixtures— Application to the Determination of Glycerol. D. T. Englis and L. A. Wollerman. Anal. Chem., 24, 1983–1985 (Dec. 1952).

Oxidation of glycerol by acidified dichromate is accompanied by the formation of an equivalent amount of chromic salt (sulphate). Dichromate may be determined by spectrophotometry at 350 mµ. without interference from the chromic salt, or the latter may be similarly determined at 587 mµ. without interference from the former. Determination of the chromic salt is preferred, as its quantity is proportional to the material oxidised, and errors due to the diln. necessary if the dichromate is determined are eliminated. Analytical procedure and preparation of standards are detailed.

J. W. D.

Propagation of Error in Spectrophotometric Colorimetry. I. Nimeroff. 37th Annual Meeting of the Optical Society of America: Anal. Chem., 24, 1682 (Oct. 1952).

Most investigations of colour and colour specification have dealt with visual sensitivity to colour stimuli, and have neglected the uncertainty of measurement of spectral data resulting from recurrent and random fluctuation such as slit width and stray energy effects, lack of reproducibility between instruments, and lack of repeatability on the same instrument. Theory of error propagation in computed results leads to an expression by means of which it is possible to calculate uncertainties in computed C.I.E. chromaticity coordinates resulting from known uncer tainties in spectrophotometric data. Assuming the uncertainty to be constant, a simpler expression for the chromaticity coordinate uncertainties is developed, independent of the spectral curve. As in visual colorimetry, an instrumental measurement of chromaticity coordinates does not establish a single point on the chromaticity diagram, but rather indicates that the true chromaticity point probably lies within an approximately elliptical area surrounding it. J. W. D.

Defective Colour Vision. F. Jordinson. J.S.D.C., 69, 73-76 (March 1953).

New Studies on Defective Colour Vision. W. D. Wright Nature 170 904 908 (29 Nov. 1952)

Wright. Nature, 170, 904-906 (29 Nov. 1952).
Of the three possible types of dichromatic colour vision, deuteranopia (usually referred to as "green-blindness") is now thought to be the result of fusion of the red and green Interesting developments are reported in the study of tritanopia (blue-blindness), about which only vague and scanty knowledge was available until quite recently. As a result of incorporating in an article published in Picture Post in 1951 a chart with colours specially designed to detect tritanopes, nearly 900 replies were received. Although most of these were from red-green defectives or from partial tritanopes, about 40 replies were from genuine tritanopes. Seventeen cases were definitely confirmed by laboratory tests, and seven of these were scientifically examined using the chromaticity chart based on the Maxwell colour triangle. The results support the view that tritanopia is due to the blue receptors. Cautious estimates of the extent of tritanopia suggest that it lies between 1 in 13,000 and I in 65,000, which is extremely small compared with the other forms of dichromatic vision. The survey also revealed that the ratio of men to women tritanopes (I-6: I-0) is much lower than with red-green defectives (16:1.0).The social aspects of defective colour vision are stressed; e.g. not only is good colour vision essential in the dyeing, printing, and painting industries, but also in radio and electrical engineering, where colour codes are widely used, and in many branches of agriculture and

Size of Acceptable Colour Differences. H. R. Davidson and E. Friede. 37th Annual Meeting of the Optical Society of America: Anal. Chem., 24, 1682 (Oct. 1952).

In order to determine the size of acceptable colour differences for a particular production problem, ca. 12,000 individual judgments of the acceptability of ca. 300 samples as matches with 19 standards were made. The samples represented colours throughout the gamut, and various sizes of colour difference from the standards. Colorimetric measurements of the samples were made and plotted in the standard C.I.E. space. Ellipsoids were then drawn round each standard to include as nearly as possible all samples considered to be acceptable in 50% of the observations, and to exclude all others. The ellipsoids so determined had radius vectors of ca. 2.5 times those of the MacAdam ellipses in the chromaticity plane, and had a radius vector of ca. 0-15 Munsell unit parallel to the y axis. Colour differences were cale, by several currently used methods and plotted against the visual judgments of acceptability. Calculations based on small modifications of the MacAdam ellipses were found to correlate with the visual results much better than do those based on other methods. J. W. D.

Fading Lamp. K. Hoffmann. Melliand Textilber., 33, 1040–1043 (Nov.), 1121–1124 (Dec. 1952).

The light fastness of dyeings, etc. is determined by exposing the samples, which are arranged on the surface of a rotating drum, through a 2-mm. Schott BG 19 filter to the combined radiation of mercury-vapour lamps (Osram HQA 500, protective bulb removed) and 500-w. filament lamps, which are arranged within a circular reflector around the drum. Cooled, moistened air is passed through the apparatus. The spectrum characteristics of the incident radiation are compared with those of other sources; they are fairly close to those of sunlight. The apparatus gives results that correlate closely with those obtained by means of daylight exposures; in particular, the times for perceptible fading of the eight D.E.K. light-fastness standards correlate closely with the results of daylight exposures, and also with results obtained with the Atlas Fadeometer. In order to facilitate interpretation of results of exposures to artificial light, data are given on the variation of natural illumination with the time of year and the inclination of the sample.

Colorimetry of Bronze Paints. W. E. K. Middleton and A. G. Mungall. J. Optical Soc. Amer., 42, 969–970 (Dec. 1952).

In comparing bronze paints with standards such as Munsell papers, illumination and viewing conditions must be arranged to render metallic reflection inconspicuous. Completely diffuse illumination and normal viewing are very satisfactory, and a small integrating sphere makes comparison relatively easy. Colours of 24 samples so measured correlate closely with those calc, from measurements on a recording spectrophotometer with the specular component included.

J. W. D.

Permanent Glass Colour Standards for Maple Syrup and Honey. B. A. Brice and A. Turner. 37th Annual Meeting of the Optical Society of America: Anal. Chem., 24, 1682 (Oct. 1952).

Simple colour comparators have been developed and officially approved, and are in general use; they employ selected amber glasses which have been matched to the previously accepted caramel-glycerol standards. Turbid suspensions replace the clear blanks when cloudy syrup is being graded. Three glass standards are used for syrup, but six for honey, two comparators being required in the latter case.

J. W. D.

Accelerated and Outdoor Weathering of Coloured Vinyl Films. F. G. Clark. Ind. Eng. Chem., 44, 2697-2709 (Nov. 1952).

The results of weathering twenty-five coloured vinyl films under twelve different sets of outdoor conditions and in two accelerating machines (Fade-Ometer and XIA Weather-Ometer) are compared. Degradation of the films and fading occurred. With glass covers a 40% longer exposure is required to achieve the same degradation as by direct exposure. A rise of temperature

increases the rate of degradation more than the rate of fading for outdoor tests. The XIA Weather-Ometer causes degradation at the same rate as fading; with the Fade-Ometer degradation is 1-9 times as fast as fading. The Weather-Ometer is considered more reliable than the Fade-Ometer, and there is some correlation with the results of outdoor tests, but outdoor testing is considered more reliable.

A. J.

Quantitative phenols by Paper Chromatography. J. H. Freeman. Anal. Chem., 24, 2001–2002 (Dec. 1952).

When the weight of paper comprising a spot on a chromatogram is plotted against the logarithm of concn. of the component which produced it, a straight line results. Unknown conen. may then be directly obtained from the determined wt. of their corresponding spots. Areas and wt. of several pairs of spots, representing duplicate conen. of substances present in a phenol-formaldehyde reaction mixture, are compared. The % wt. variation is seldom more, and is often less, than the area variation for spots representing equal conen. of a substance. The prep. of the chromatogram and the cutting out and weighing of the spots are fully described.

PATENT

Testing the Resistance of Materials to Abrasion. U.S. Secretary of Commerce. USP 2,603,083

An abrasive disc rotates horizontally, and the patterns are pressed on to its upper surface. The axes of the disc and of the support for each pattern are parallel and rotate at the same angular velocity.

C. O. C.

Synthetic Detergents (VII p., 132).

#### XV-MISCELLANEOUS

Place of the Technologist in our Industry. F. L. Goodall. J.S.D.C., 69, 7-11 (Jan. 1953).

Incidence of Bladder Tumours in a Dye Factory.
T. S. Scott. Brit. J. Industrial Med., 9, 127-132 (1952): Chem. Abs., 47, 323 (10 Jan. 1953).

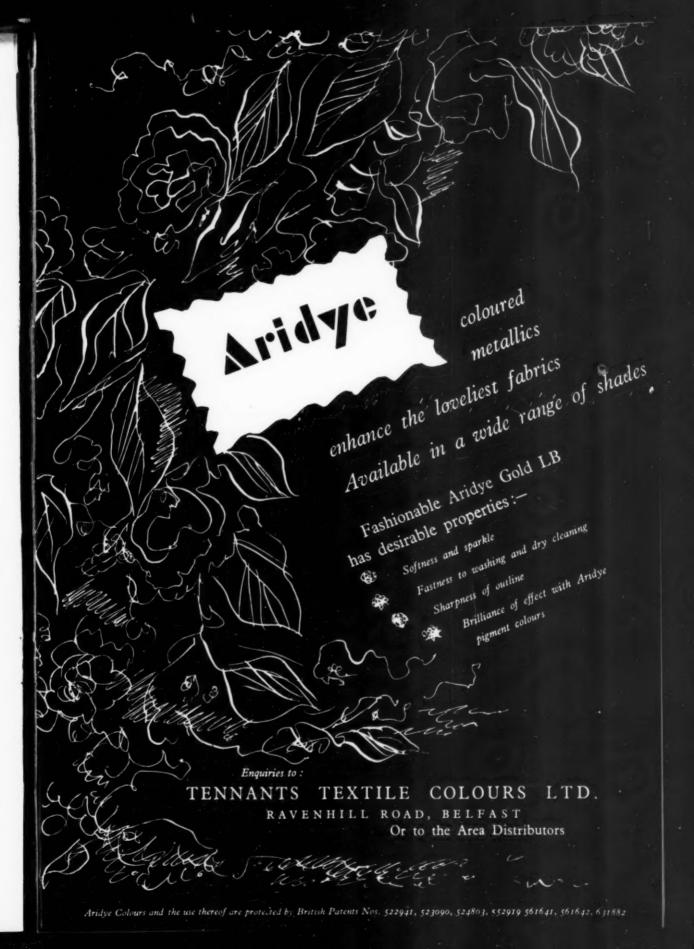
Of 66 cases of bladder tumour in a dye factory, 30 were attributed to benzidine alone, one to a-naphthylamine containing about 4% benzidine as an impurity,  $\beta$ -naphthylamine alone, 16 to the mixed effects of all three compounds, and the \*emainder to other exposures of doubtful etiological significance. In the last group one man had been employed in making  $\beta$ -naphthylamine for 3 months, and for the next 27 years had served as a boiler fireman in the factory (not included as a  $\beta$ -naphthylamine case because of short time of exposure). Another worker developed a papilloma after 28 years of making o-toluidine and chlorotoluidines, with no contact with benzidine, but close to an area where  $\beta$ -napthylamine sulphate was baked to make naphthionic acid. A third worker developed bladder carcinoma after 5 years of making aminosalicylic acid near an area where dianisidine was made. No cases were traced which could be attributed to anil ne, despite the longer time of manufacture and periods of exposure and the similar number of workers engaged on it compared with benzidine or  $\beta$ -naphthylamine. thus seems that benzidine is as dangerous an industrial carcinogen as  $\beta$ -naphthylamine. Men under 30 should not be employed in making or handling known or suspected bladder carcinogens, and, where possible, healthy men over 40 should be employed in such processes. C. O. C.

PATENTS

Pencil Leads, Crayons, etc. A. R. Julien. BP 686,444 Crayons, etc. comprise a colouring material and < 50%by wt. of a thermoplastic, which is preferably wholly or partly polymerised during the making of the crayons.

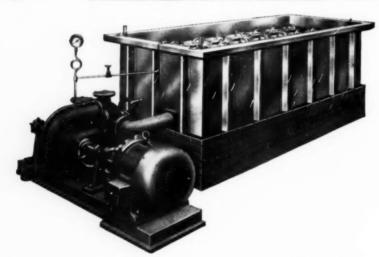
Colouring the Outer Surface of Cheese, Ice Cream, and other Foods. Transparent Packing Co. BP 686,194

Cheese, etc. has its surface completely coloured by encasing it in a permeable film, e.g. of regenerated cellulose, which has been uniformly and completely impregnated with a dye for the food.



# Top Dyeing

- No Felting or Damage
  - Short Liquor-ratio for Steam Saving
    - Stainless Steel throughout



# Rapid Handling of Material

- Excellent penetration and uniformity of shade
- Equally suitable for dyeing Ball and Hank
- · Minimum noils if re-combed
- Mechanical parts, especially valves, reduced to a minimum



BOWMAN LANE WORKS LEEDS 10 ENGLAND

Telephone 21978-9

#### SITUATIONS VACANT AND WANTED etc

Replies may be addressed "Box —, Society of Dyers and Colourists," Dean House, 19 Piccapilly, Bradford, Yorks., where all communications relating to these Advertisements, which are treated in strict confidence, should be addressed.

The Publications Committee is prepared to receive Advertisements relating to SITUATIONS VACANT, SITUATIONS WANTED, or MISCELLANEOUS ITEMS for insertion on this page of the Journal. Advertisements of Situations Wanted are gratis to individual members, but must not exceed twenty-four words in length.

All inquiries relating to Advertisements in the Journal should be addressed to The General Secretary, The Society of Dyers and Colourists, Dean House, 19 Piccadilly, Bradford, Yorks.

#### SITUATIONS VACANT

TEXTILE CHEMIST required for Dye Works Laboratory, to supervise research and routine testing—George Pearson & Sons, Ltd., Basford, Nottingham.

WALKDEN, MAKIN & CO. LTD. invite applications for a high-class Sales Representative who has had a good works training. Commencing Salary £1,000 per annum. Staff Pension Scheme. Applications (which will be treated in strict confidence) should include full details of age, training and experience and should be addressed to the Managing Director, Walkden, Makin & Co. Ltd., Clayton Lane Dyeworks, Openshaw, Manchester 11.

WANTED Smart young fellow to train for control of Standfast Molten Metal Dyeing Process. Must have Diplomas in Vat Dyeing of Cotton and Rayon Piece Goods. Good opening for suitable applicant. Apply to The Maine Works, Cullybackey, Co. Antrim, Northern Ireland.

YOUNG COLOURIST-CHEMIST preferably single required for work in laboratory abroad. Should have some experience of screen printing. State full details in Stri instance to Box V12.

#### SITUATIONS WANTED

CHEMIST COLOURIST, Inter. Science, Diploma in dyeing and finishing and three Full Tech. Certificates C. G. L. I. Dyeing of Textiles, wide experience hank, sliver and beam pressure dyeing desires post as technical adviser or Manager, also abroad. Several

HEAD DYER (35) desires change. Fully experienced costing, organisation, etc., 14 years dyeing slubbing, piece, loose wool, cotton and sliks. Scouring, earbonising, shoddy manufacturing. Box W516

TECHNICAL SALES REPRESENTATIVE. Home or abroad, technical, practical, commercial experience, dyestuffs, chemicals, pigments, auxiliary chemicals, textile, leather, paint, rubber industries. Box W509

#### MISCELLANEOUS

 $\mathbf{S}_{\mathbf{drive},\ \mathbf{mangle}}^{\mathbf{ECOND-HAND}}$  modern high speed Clip Stenter complete with price of Box M801.

WANTED Moisture Testing Oven (Goodbrande). Price and condition to Mellors (Dyers) Ltd., Crumpaall Vale Dyeworka, Blackley, kanchester 9.

#### MEMBERS AND JUNIOR MEMBERS

Persons desirous of joining the Society as Ordinary Members or Junior Members may obtain Application Forms from the General Secretary, or from the Honorary Secretary of any Section of the Society

#### **NEW MEMBERS**

Blair, H. S., 30 Albert Street, Bangor, Co. Down, Northern Ireland

Boyd, F. C., 63 Kingsway, Middleton Lancs.

Cockshot, J. S., 8 Queens Road, Bradford Cowper, G., 8 Park Street, Hawick, 8 Park Street, Hawick, Roxburghshire, Scotland

Grimmer, D. F. J., c/o Geigy Co. Ltd., 46 Old Bond Street, London W.1

Hamilton, J., 1567 Dumbarton Road, Glasgow W.4 Hesse, L. M., Homefield House, Old Couladon, Surrey Hobson, B. C., 46 Westminster Rd., Otley Rd., Bradford Hughes, R., Seafield Fabrics Ltd., Youghal, Co. Cork, Eire

Joshi, G. D., 21 Burns Street, Leven Vale, Alexandria, Dumbartonshire

Kowalski, L. J., 7 Factory Lane, Milnsbridge, Huddersfield Kresowski, C., 17 Bedford Avenue, Whalley Range,

Manchester 16 Liptak, J., "Vucotextil" SRL, Jose Ingenieros 1422, Beccar, F.C.N.G.B.M., prov. Buenos Aires, Argentine

Mathews, L. A., 9 Maylands Avenue, Elm Park, Hornchurch, Essex

Moore, W. R., Dept. of Chemistry & Dyeing, The Technical College, Bradford

Murray, T., 1 Balgair Drive, Paisley, Scotland O'Malley, G. K., 12 Rowan Park Avenue, Stradbrook, Blackrock, Co. Dublin, Eire Richmond, Dr. K. W., 26 Downs Road, Luton, Beds.

Schwarz, E. W. K., 9949 Shore Road, Brooklyn 9, N.Y., U.S.A.

Simpson, J., c/o Messrs. Wm. Barbour & Sons Ltd., Hilden Thread Works, Lisburn, Northern Ireland

Waite, K. M., 7 Welwyn Avenue, Wrose, Shipley Wood, P. J., Royce Chemical Co., Carlton Hill, New Jersey, U.S.A.

#### **NEW JUNIOR MEMBERS**

Ainley, D., 37 Heckmondwike Road, Dewabury, Yorks. Briggs, C. R., 13 Miall Street, Longside Lane, Bradford McCracken, W. J., Admiralty Cottage, Antrim, Co. Antrim, Northern Ireland

 Morrow, T. E. C., 26 Gt. George's Street, Warrenpoint,
 Co. Down, Northern Ireland
 Pattinson, N., 56 West Park Grove, Roundhay, Leeds 8
 Trueman, H. N., 30 Ormonde Park, Finaghy, Belfast, Northern Ireland

Watson, S. J. N., 7 James's Street, Lisburn, Co. Antrim, Northern Ireland

Wood, G., 505 Rochdale Old Road, Jericho, Bury, Lanes.

#### ADDRESSES WANTED

Black, S. R., formerly of c/o L. B. Holliday & Co. of Canada Ltd., Suite 26-27, Bank of Toronto Building, 1410 Guy Street, Montreal, Canada

Brun, J. S., formerly of P.O. Box 20, Bergen, Norway Crummett, K., formerly of 14 St. Austell Road, Man-

chester 16 Evelbauer, H. L., formerly of Friedrichsster F., Marburg (16), Hessen, U.S. Zone, Germany

Faulkner, J., formerly of 53 Garden Village, Muckamore, Co. Antrim, Northern Ireland

Freeman, S. R. T., formerly of 8 The Avenue, Blaby, near Leicester

Grime, S. M. (Miss), formerly of 21 Brackley Road, Monton Green, Eccles, Manchester

J., formerly of "Greystones", St. Martin's Road, Marple, Cheshire

Kazan, R. E., formerly of c/o Howards & Sons Ltd., 518 Castle Building, 1410 Stanley Street, Montreal, P.Q., Canada

Kozak, J., formerly of 102 Foxhall Road, Nottingham Lowe, R., formerly of 17 Ashdown Avenue, Leicester Matchar, H. I., formerly of 22 Jamuna Ninas, 2nd Floor, Bhatt-Wadi Lane, Girgaon, Bombay 4, India Sykes, J. H., formerly of 75 Hill Crescent, Howden Clough,

Birstall, near Leeds

### IMPORTERS FROM GERMANY

0

Naphtols Bases Salts
Rapid-Fast-Colours
Rapidogens Rapidazols etc
Stable Solubilized Vat Range
Vat Dyestuffs Pigments etc

AUXILIARIES

FULL PARTICULARS FROM

## BERNARD KEEGAN LIMITED

164 GARNETT STREET BRADFORD

Telephone 26717 (3 lines)

Telegrams CHEMDYE BRADFORD



The inherent characteristics of the Mono Pump provide all the essentials for an efficient portable pumping unit. Constructed on robust lines, the total weight is moderate and the unit is compact enough to be moved with ease or to negotiate a standard doorway. The mechanism is simple and there are no valves to adjust. Unfailing self-priming and powerful suction ability make casual pumping duties a quick and easy operation. With its uniform velocity of flow, the Mono Pump is able to handle free-flowing or viscous fluids and it can be applied to transfer or filtering duties. Cast-iron, Gunmetal or Stainless Steel units are available.



Telephone: Holborn 3712 (6 lines)
Cables 1 Monopumps, London · Code: A.B.C. 7th Edition

TOMONO

and at Birmingham. Dublin, Glasgow. Manchester, Newcastle, Wakefield,

A Range of Products for the Finishing of all classes of Textile Fibres

For the Softening of Rayon, Cotton, Linen, Wool, etc.

For Softening, etc., as WTN only in soft water

classes of Materials. Ex-tremely Efficient and Economical

AGENTS

AGENTS

SCOTLAND—Hr C, Stawart, "Nilsumbi", Bearsden,
Dumbartonshire
IRELAND—Alfred Cotter Ltd. 7 Corporation Sq. Belfast
AUSTRALIA—Vance & McKee Pty. Ltd. 235 Clarence
Street, Sydney
Vance & McKee Pty. Ltd. 40 William
NEW ZEALAND—S. W. Peterson & Co. Ltd.
IdS Vivian Street, Wellington
INDIA—George Willis & Sons Ltd England.
Distributors—Nagindas Kilabhai & Co. Lalgir
Chambers, Tamarind Lane, Bombay, Branches—
Ahmedabad, Cawnpore, Calcutta, Coimbatore, etc.



The HEXORAN CO LTD

UNITY WORKS BELPER DERBYSHIRE

Telephone Belgor 471
Telegrams PROGRESS BELPER

ESTABLISHED 1877

We have been Manufacturing

## **DYESTUFFS**

for more than Seventy Years!

Why not avail yourself of our long experience? It is freely at your disposal.

Williams CHOUNSION Ltd.

HOUNSLOW

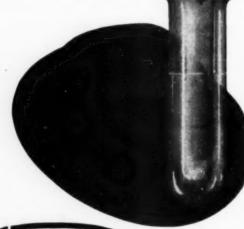


MIDDLESEX

## AMOA CHEMICAL CO LTD HINCKLEY LEICESTERSHIRE

EMULSIFIERS · EMULSIONS READY FOR USE
WETTING AGENTS · SIZING ASSISTANTS
SOLUBLE WAXES · SULPHATED FATTY ALCOHOLS
DULLING AGENTS · WINDING AND KNITTING OILS
DETERGENTS · SOFTENING AGENTS
SAMPLES AND LITERATURE AVAILABLE

## MAKING ITSELF FELT



#### CHLORIC ACID

Modern technique in the production of fine quality fur felts for hat manufacture calls for the use of special chemicals of which Staveley Chloric Acid is an outstanding example.

STAVELED

BASIC CHEMICALS FOR INDUSTRY

THE STAVELEY IRON & CHEMICAL CO. LTD.

NR. CHESTERFIELD

Quality Dyes and Products

White the Book of the Bull Superior Dive AR

No technome Fast Yellow O

Duporton Rubinol P.

For semples and Products

Apply

L B HOLLIDAY & CO LTD HUDDERSFIELD

## **Brilliant Avirols**

(ANION ACTIVE FINISHING AGENTS)

FOR A PERFECT HANDLE ON SPUN RAYON FABRICS

No adverse effect on dyed shades

THE GARDINOL CHEMICAL CO LTD MILNSBRIDGE HUDDERSFIELD

Telephone MILNSBRIDGE 287



## CHAS. FORTH & SON

LIMITED

CHEMICALS
for Dyers & Bleachers
ACIDS ALKALIES SOAPS



DYESTUFFS
for all purposes

DYEWOOD EXTRACTS HEMATINES

Telephones 75147-75148

Code ABC 5th Edition

NEW BASFORD NOTTINGHAM

Telegrams
DELTA-NOTTINGHAM



## **BROWN & FORTH**

LIMITED

FOUNDED 1890

**DYESTUFFS** 

SODIUM CHLORITE

CHEMICALS
FOR TEXTILES

83-117 EUSTON ROAD LONDON NW I

MANCHESTER 15

EUS 5101-5 MOS 1347-8

AND AT NEW YORK

The most powerful and stable SEQUESTERING AGENT

## **NERVANAID B**



Renders inactive the ions of Calcium, Magnesium, Aluminium, Iron and Copper. Invaluable in textile processing and many other industries



Samples and details from the manufacturers

NORMAN EVANS & RAIS

-LIMITED

**DUDLEY ROAD, MANCHESTER 16** 

Telephone Moss Side 2277
Telegrams CHRIEVAN MANCHESTER

## J B WILKINSON (CHEMICALS) LTD

SODIUM HYDROSULPHITE

and CHEMICALS FOR DYERS BLEACHERS PRINTERS and all Branches of the Textile Industry

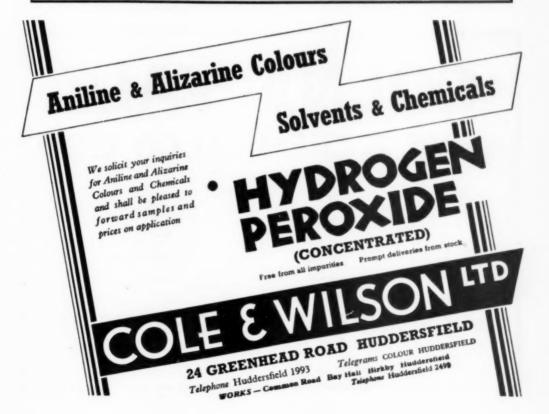
DUDLEY HILL CHEMICAL WORKS BRADFORD

## DYESTUFFS · ULTRAMARINES

**DURA BEAU HOSIERY FINISHES** TEXTILE AUXILIARY PRODUCTS AND FINISHES

QUEEN'S CHAMBERS T. SAVILLE WHITTLE LTD 49 PRINCESS STREET

Tolograms SENILINA MANCHESTER



## Important Announcement

#### GENERAL METALLURGICAL & CHEMICAL LTD

has for years been known to its friends as "GEMEC" (for short) which word is one of the Company's registered trade marks. The Board of Directors take pleasure in announcing that the name of the Company has, with permission of the Board of Trade, as from 30th March 1953, been changed to

GEMEC LIMITED



# COLNE VALE DYE & CHEMICAL CO LTD

MANUFACTURERS OF

BISMARCK BROWN R and Y Conc. and Base PURE CHRYSOIDINE Y D and

R D and Base INDULINE (Water Soluble) INDULINE (Spirit Soluble) INDULINE BASE NIGROSINE (Water Soluble) NIGROSINE (Spirit Soluble) NIGROSINE BASE BASIC MAGENTA ROSANILINE BASE ACID MAGENTA Come.

PURE SOL. BLUE 1 Cone.
PURE SOL. BLUE 3 B Cone.
SOLUBLE BLUE Cone.
ACID. BASIC. DIRECT and

WATER BLUE R Conc INE BLUE N and B N INE BLUE SPECIAL SPIRIT BLUE INDIGO CARMINE C V Ex-LAUNDRY BLUES METACHROME MORDANT

Also full range of ACID, BASIC, DIRECT and CHROME COLOURS
Samples and Prices will be forwarded on application

MILNSBRIDGE HUDDERSFIELD

Telegrams ANILINE HUDDERSFIELD

Telephone Milnsbridge 3

## IMPORTANT TO DYERS AND FINISHERS OF WHITES AND LIGHT SHADES

#### CHROMIUM PLATING

will enormously reduce your damaged and spoilt cloths, yarns etc

> Have your rollers and other steel parts CHROMIUM PLATED by

THE SANDA METAL CO LTD BRADFORD

Telephone Dudley Hill 234-235

YOU WILL SAVE MONEY
WE SPEAK FROM EXPERIENCE

#### **GEOMETRIC GREY SCALE**

for Assessing the Effect on the Pattern in Fastness Testing

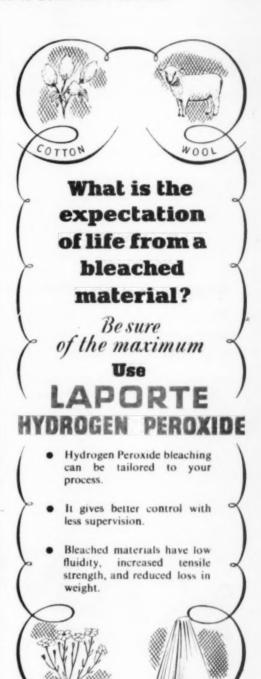
NOW AVAILABLE

PRICE 6/-

from

THE SOCIETY OF DYERS & COLOURISTS
19 PICCADILLY

BRADFORD YORKSHIRE ENGLAND



For further details apply to

LAPORTE CHEMICALS LTD · LUTON

Telephone Luton 4390

Telegrams LAPORTE LUTON

RAYON

#### WHAT IS YOUR ANGLE?

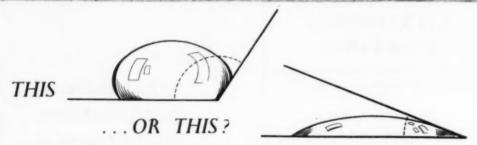


Illustration of negative wetting (angle of contact greater than 90°) and positive wetting (angle of contact 90° or less)

#### Refer to us if WETTING is a problem in your production

We market what we believe to be the most powerful Wetting Agent available today, and feel that it may be of great assistance in your wetting and dispersing problems.

Literature and samples on request.



#### HARDMAN & HOLDEN LIMITED

MANOX HOUSE . MILES PLATTING . MANCHESTER IS

TELEGRAMS : " OXIDE," MANCHESTER - TELEPHONE : COLLYHURST 1881 (18 11mm)



## Notice to Authors of Papers

The MSS. of all papers communicated to or read before the Society become the property of the Society. They should be addressed to the Editor, Society of Dyers and Colourists, 19 Piccadilly, Bradford. Authors must not allow their papers to be published elsewhere before they have appeared in the Society Journal. Should prior publication take place without the sanction of the Publications Committee, the paper will be printed only as an abstract or summary.

Manuscripts submitted for publication in the Journal should be typewritten (double spacing) on good-quality paper, using one side of the paper only and leaving a margin at least I in. wide on the left-hand side. The time taken in refereeing papers (both lectures and communications) will be reduced to a minimum when authors submit two copies of the typescript.

In view of the high costs of publication, it is essential that authors should be as concise as possible. When experimental procedure has already been published, a literature reference to the paper containing the details is sufficient, whilst well known experimental methods should be described very briefly.

Introductory paragraphs describing the aims of the investigation and the method of attack are desirable, and should be followed by the experimental results and their discussion. There should be a brief summary for insortion the beginning of the paper. References to the literature should be numbered consecutively, using superscript numbers without brackets immediately following the text words or author's name to which they refer.

The list of references should be given at the end of the manuscript and the abbreviations used should be, as far as possible, those given in the "List of Periodicals Abstracted" included at the end of the Index to the preceding year's Journal. Reference numbers in this list should be neither enclosed in brackets nor followed by full-stops. As far as possible throughout the manuscript the abbreviations listed in the Jan. 1950 issue (p. 54) should be used. Tables should be numbered consecutively in Roman numerals and Figures in Arabic numerals.

The number of figures and graphs should be kept as low as possible, and data should be presented in the form of either tables or graphs, not both. Drawings should be carefully prepared, preferably in Indian ink, on plain white drawing paper or, preferably, Bristol board. In graphs, the frame and actual curves should be ruled and inked more heavily than any co-ordinate lines, and the latter should not be close together as in ordinary graph paper. Experimental points should always be given, and where several graphs appear in a single Figure clear means of differentiation must be adopted. All numbers and legends are set up in type by the printer, and authors should therefore indicate them lightly in pencil.

Twenty-five free copies of a reprint are supplied to the author of an original paper published in the *Journal*, or fifty free copies are supplied when there are two or more authors, and a further number may be purchased from the Society at the rates given below.

#### REPRINTS OF LECTURES AND COMMUNICATIONS

Reprints of all lectures and communications are available after publication to members and non-members of the Society. The charges (postage included) are as follows—Single copies 2s. 6d. each; per dozen copies up to and including 8 pages, 12s. 6d., and for papers occupying more than 8 pages of the Journal, 17s. Orders should be addressed to "The Society of Dyers and Colourists, 19 Piccadilly, Bradford". They can be accepted only if accompanied by remittance and if received immediately after publication of the paper.

## PUBLICATIONS of the SOCIETY OF DYERS AND COLOURISTS

(All publications are sent post free)

JOURNAL OF THE SOCIETY OF DYERS AND COLOURISTS
(published monthly)

Price to Non-members per annum £4

THE THEORY AND PRACTICE OF WOOL DYEING (Second Edition)

By C L BIRD Price 15s

IDENTIFICATION OF DYES ON TEXTILE FIBRES AND DETECTION OF METALS IN FIBROUS MATERIALS, DYES, AND ORGANIC PIGMENTS (Second Edition)

By ELLIS CLAYTON Price 10s 6d

SECOND REPORT OF THE FASTNESS TESTS COMMITTEE

Price 2s 6d

REPORTS OF THE COMMITTEES ON THE DYEING PROPERTIES OF DIRECT COTTON, VAT, AND WOOL DYES

Price 5s

#### THE TINCTORIAL ARTS TO-DAY

Proceedings of a Conference held at Harrogate in September 1951

Price 15s Members

£1 5s Non-members

#### PHOTOCHEMISTRY IN RELATION TO TEXTILES

Proceedings of a Symposium held at Harrogate in September 1949

Price £1 Members £1 10s Non-members

## RECENT ADVANCES IN THE THEORY AND PRACTICE OF DYEING

Unbound Volume of the Proceedings of a Symposium held at Blackpool in September 1947

Price 15s

#### REVIEW OF TEXTILE PROGRESS

Volume I 1949

Volume II 1950

Volume III 1951

Volume III 1951

L1

5s

L1

Sto T.I & S.D.C Members)

THE SOCIETY OF DYERS AND COLOURISTS
19 PICCADILLY BRADFORD YORKSHIRE ENGLAND